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A Comparative Approach to Fiscal Illusions: a Synthesis of the Conclusions from a Polish Study in Relation to New Ideas and Empirical Research in Selected Countries[1]

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Abstract

This article examines fiscal illusions in public finance systems where decentralisation involving the introduction of an independent and autonomous component of local government funding brings new problems. It presents a synthesis of the findings from a Polish empirical study that set out to determine the types and extent of fiscal illusion among Polish councillors, focusing on the qualitative aspects of the phenomenon. It also compares the findings with other streams of research and new approaches to fiscal illusion. The purpose of the article is to systematise the knowledge of fiscal illusion based on selected empirical studies, to formulate proposals for practitioners and public decision-makers, and to highlight areas for future research to address. The article was prepared using a desk research approach and the author's own experiences and research perspective formed during the study of fiscal illusions. The findings presented in the article corroborate its main thesis that a local government funding system based on intergovernmental transfers contributes to the emergence and perpetuation of fiscal illusions.

Keywords: fiscal decentralisation, fiscal illusions, intergovernmental fiscal relations, local taxes

JEL: H70, H71, H77

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Introduction

Fiscal illusions have long been an interesting subject matter for economists, political scientists, management and administration scientists, sociologists, and psychologists. The term 'illusion' has psychological connotations and is interpreted as incomprehension, misperception, misinterpretation, or misjudgement about things, phenomena, or processes. An illusion is, therefore, a behavioural reaction that frequently arises when we are lying to ourselves or to other people, or as a form of self-defence against objective facts and circumstances.

Fiscal illusion is understood to follow from the incomprehension of public finance laws and mechanisms. It can affect politicians, public administration staff and public officials, as well as ordinary citizens (taxpayers, voters, and the beneficiaries of public funds). The classical literature on fiscal illusion was inspired by the new political economy and initially focused on the taxation problems (Oates 1972; 1998 pp. 65–82; Dollery and Worthington 1996, pp. 296–297; Buchanan 1997, pp. 158; Gemmell, Morrissey, and Pinar 2002, pp. 199–224). A well-known stream within public finance science which developed in Italy and is frequently referenced to in the literature emphasises the fundamental importance of the structure and nature of political institutions in the creation of fiscal illusions, whereas the Anglo-Saxon approach underscores the public authorities' inclination to hide the true costs of taxes (see: Guziejewska 2016a, pp. 58–61).

The progress in decentralisation processes observed in many countries in recent decades has increased interest in considering fiscal illusion in terms of local government finances and intergovernmental transfers (Oates 1979; Rosen 1999, p. 502; Mueller 2003, p. 221; Gordon 2004, p. 1776). Although local governments have fewer fiscal and legislative powers than the central government does, they do have some financial autonomy and independence, which leads to the emergence of sometimes complicated intergovernmental fiscal relations. The emergence of fiscal illusions is traditionally attributed mainly to incomplete information and unequal access to it, which are used by opportunistic politicians to maximise their self-interests and improve the odds of re-election. The appearance of new fiscal illusions in decentralised systems is believed to be caused by the complexity of intergovernmental fiscal relations, the central government devolving more and public services to local governments without providing them with access to efficient and adequate sources of funding (local taxes, etc.), and the complicated mechanisms governing intergovernmental transfers. As well as contributing to the emergence of illusions, fiscal decentralisation, especially one that is limited and incomplete, also gives rise to moral hazards and ineffective redistribution of public funds (Akin, Bulut-Cevik and Neyapti 2016, pp. 690–705). The macroeconomic studies on fiscal illusions consider it from the perspective of public debt and accrual accounting, which can lead to the development and amplify many fiscal illusions about public authorities' assets and liabilities (Irwin 2016, pp. 219–227). This leads to a question about whether fiscal decentralisation tightens fiscal discipline,

thus becoming an element of soft budget restrictions, or rather relaxes it. It is believed that the emergence of fiscal illusions can be hindered or prevented by subjecting the public finance sector to institutional rules and principles, as well as by tax competition (Ahmad and Brosio, 2015, pp. 85–106).

A research project devoted to fiscal illusions carried out in Poland between 2015 and 2016 analysed and compared the qualitative and quantitative aspects of the phenomenon, concentrating on the qualitative factors that are frequently neglected in studies. Information for this study was collected during in-depth interviews and a questionnaire survey of councillors representing communities in the seven largest Polish cities. In the article, the main findings of the study are juxtaposed with new views, ideas, and the outcomes of empirical research into fiscal illusion. The article also systemises the existing knowledge of fiscal illusions based on selected empirical studies, formulates recommendations for practitioners and public decision-makers, and indicates areas for future research. It was prepared using a desk research approach and the author's own experiences and research perspective formed during the study of fiscal illusions among Polish councillors.

This article is a theoretical work. It consists of the introduction section, a synthesis of the results of the empirical qualitative study on fiscal illusions in Poland, an overview of some recently published empirical studies, ideas and perspectives, and the conclusions section.

A synthesis of the findings of the Polish study, with a special focus on the results of in-depth interviews

The problem of fiscal illusion among local governments is gaining in importance as more and more costly public services are devolved to lower levels of government without the distribution of adequate tax revenues. The general public in representative democracies do not need to understand the mechanisms of public life and public finances, which are quite frequently complicated, but those who represent them, including city councillors, can be rightly expected to have knowledge of them. The assumption was used as a starting point to study fiscal illusions among the councillors in several of the largest cities in Poland. The first phase of the study, intended as a pre-test, included a series of focused, in-depth interviews with ten councillors from the city of Łódź (qualitative research). The councillors' answers to open-ended questions were used to prepare detailed questionnaires, which were then distributed to councillors in the seven largest Polish cities (quantitative research). Both phases of the study led to similar conclusions (Guziejewska 2016b, pp. 483–489).

The questions asked during the in-depth interviews and the questionnaire survey concentrated on the special design of the local government funding system in Poland, with intergovernmental transfers as the primary source of funding for the subnational levels of government. Intergovernmental transfers should be understood as including

not only general grants and specific grants but also local governments' shares of personal income tax (PIT) and corporate income tax (CIT; shared taxes) collected by the central government. It is notable that among Polish taxes, only the property tax is fiscally efficient. Therefore, the questions asked during both phases concerned the range of locally administered taxes in relation to fiscal autonomy and respondents' expectations as to other sources of local revenue (general and specific grants).

According to information gathered during the in-depth interviews, the main source of the councillors' fiscal illusions was their superficial knowledge of finances and budget management, as well as political factors. The study started with an assumption that because councillors have many regular and ad-hoc responsibilities, including financial ones, they would have a good general knowledge of the system through which local governments are funded. The assumption proved exaggerated. Councillors admitted that their financial interests were focused on matters vital for local residents but relatively unimportant in terms of the entire financing system. However, although limited, their general knowledge of the financing of the local governments' tasks was diverse and associated with their function on the council and its commissions.

An analysis of answers to the specific questions confirmed a high level of fiscal illusions among councillors. Many of them were for increasing the municipalities' shares of PIT and CIT, and the overwhelming majority opposed increases in municipal taxes, charges, and fees. The councillors were also strongly averse to making local revenues the main source of funding for the municipality. Some of the councillors who were against increasing resident taxation observed that municipalities needed more effective ways to collect amounts due to them.

The councillors had a problem answering the question about what systemic solutions might be effective in increasing municipalities' revenues. Most of them wanted intergovernmental transfers (the municipal shares of PIT, as well as general grants and specific grants) and the education component of the general grant to be increased. The need to stimulate the development of the local economy was also indicated. Generally, however, the councillors' primary concern was that the local tax burden not be increased, as if they did not understand that general grants are funded from taxes paid by all citizens in the country. The way they formulated their answers also betrayed an undertone of distrust in the government. In order to explain their aversion to changes, the councillors recalled cases when the government failed to respect the principle of adequacy. Nonetheless, many respondents found the existing local revenue system to be good and in no need of major changes.

While debt was indicated as one of the main problems haunting local budgets, the councillors had significantly different views on its causes and role. Some councillors blamed 'wasteful' investment projects; others argued that extensive investment efforts, although costly, were necessary to advance the city's development city. Also mentioned were the unique availability of EU funds and the need to make long-term efforts to improve the quality of life of the residents. The councillors had difficulty choosing between revenue increase and expenditure cuts as the way to reduce a budget deficit. Sev-

eral of them dodged giving a clear answer by choosing both options. Those who chose the first measure were unable to indicate which revenues should be increased.

An indication of the high level of fiscal illusion among the councillors is that none of them wanted to increase the fiscal autonomy of local authorities. The dominant opinions were that making decisions was the responsibility of national, rather than local, politicians; they also revealed some reservations about increasing residents' local tax burden. Many councillors expected the municipal shares of national taxes and general and specific grants to be increased. Neither extremely demanding nor dogmatic attitudes that involved rejecting other people's standpoints were observed among the respondents. The real property ad valorem tax as a source of local revenue found several supporters, who explained their acceptance of it by referring to the paradoxes of the property management system in place. It was, nevertheless, an unusual finding, because the tax is widely criticised as very burdensome for taxpayers.

The quantitative part of the study, during which each respondent answered 12 questions on a 5-point Likert scale, provided yet more evidence of the high level of fiscal illusion among Polish councillors. The study was innovative, given that councillors are local politicians who are a very special and uncooperative sort of respondent (the questionnaire return rate was only 23%). The statistical analysis of their answers and personal characteristics (e.g., the level of education or the number of terms on the council) did not show significant associations between them. The question about whether increasing intergovernmental transfers (general and specific grants) was the right way to boost municipal revenues was answered 'yes' or 'rather yes' by 68% of the councillors; 86% of them wanted the municipal share of PIT and CIT to be increased. Only 24% supported raises in local taxes and charges as a source of additional revenues for the municipality, whereas 72% rejected this possibility. In the opinion of 77% of the councillors, local governments in Poland should have more powers to decide on the rates of local taxes and charges ('yes' and 'rather 'yes'). Paradoxically, however, the councillors expressed their reluctance to raise local taxes during both parts of the study (qualitative and quantitative).

The councillors had knowledge of the residential property tax and did not think it was a major burden for the taxpayers; 75% of answers to the question about whether the tax was high and burdensome for the property owners were 'no' or 'somewhat no'. The introduction of the cadastral tax was opposed by most of the councillors, but 30% would support such a decision; a surprising finding given that the tax is deemed extremely controversial. Some light was shed on this inconsistency by the qualitative part of the study (the interviews) when the councillors who would accept the tax criticised the absurdities in property management caused by the property taxation system in place.

As for fiscal illusions associated with budget expenditures and budget deficit, their level was much lower among the councillors: 93% believed that expenditure cuts were the right way to reduce excessive deficit.

Table 1. A synthetic review of the results of in-depth interviews with the Łódź councillors

Specification	Basic (introductory) answer	Special vocabulary	Special behaviours and reactions	Surprising results, leading to conclusions other than expected
Opening questions	Answers emphasised the variety of matters that councillors take an interest in	n/a	One councillor excused himself from the survey, stating that he first wanted to learn more about the National Science Centre's project	Councillors avoided being reached, as they were uncertain about the character of the survey. Many of them were suspicious about its purpose and the use of its findings
Specific and deepening questions	Councillors gave very different answers to specific questions; even so, the answers proved instrumental in establishing which questions and notions the councillors did not understand. They also revealed positive correlations between a councillor's knowledge of municipal finances and their function on the council and its commissions	The use of special vocabulary by councillors was not identified during the interviews, but demending attitudes towards the government and unwillingness to assume fiscal responsibility were noticeable	Councillors avoided giving direct answers, partly because they did not have the necessary specific knowledge, and partly due to their unwillingness to discuss "touchy" matters, e.g., tax increases. Such behaviours were shown by most councillors	Councillors were found to have a very limited academic knowledge of the local government financing system, so asking the deepening questions was pointless; also, their tendency to avoid answering questions obstructed the in-depth interviews
Final and summing-up questions	The end part of the interviews was used to probe matters that the respondents omitted before	Rather than talking about vital matters, councillors made references to the majority political party on the council, the so-called "them"	As well as avoiding giving direct answers, some councillors tended to discuss matters unrelated to the question they were asked	Irrational attitudes, some councillors refused to participate in the survey without stating any reason for their decision

Source: compiled by the author from interview data.

Current lines of research on fiscal illusion and its new aspects

A review of studies on fiscal illusion, both classical and more recent, shows that most of them used the quantitative approach. While it is quite understandable in economic sciences, it also leaves a feeling of something being amiss considering the increasing role of behavioural finance, fiscal sociology, and the psycho-political determinants of economic decisions. In this situation, the introduction of the qualitative and comparative methods as the enhancement of the quantitative approach is necessary. The most appropriate methodology combines comparative and complementary methods (quantitative and qualitative tools).

Among the large-scale comparative studies on fiscal illusion, there is the study by Mourão (2008), which resulted in the creation of a fiscal index and a benchmark for democratic countries. The study used a group of 68 countries for which data on public finance transparency, etc., were available after 1960, and they examined 17 dimensions of fiscal illusion that were assigned specific variables. The study found that the degree of fiscal illusion in the selected countries was high and that it started to fall in many of them around the mid-1980s. Poland's score on the fiscal illusion index, which was scaled from 0.01 (low illusion) to 0.99 (high illusion), fell between 1960 and 2006, from 0.986 to 0.767, placing her among countries with the highest levels of fiscal illusion such as Russia, Pakistan, Guatemala, and Honduras. The leader of the ranking was Sri Lanka, while Germany, Canada, Austria, New Zealand, the Netherlands, and Sweden were at the bottom.

In 2011, Dell'Anno and Dollery constructed a fiscal illusion index for the EU member states in the macroeconomic framework using a quantitative approach and a structural equation perspective. According to their findings, the main factors that encourage the deployment of fiscal illusion strategies were the share of self-employment in total employment, the educational level of citizens, and the size of the tax burden (Dell'Anno and Dollery 2014, pp. 937–960). They also found that policy-makers attempted to 'conceal' the real tax burden by means of debt illusion, fiscal drag, wage withholding taxes, and taxes on labour. In this study, too, Poland was assigned to the group of countries with the highest average level of fiscal illusion (Romania, Cyprus, Greece, Italy, Belgium, and Bulgaria).

The combination of quantitative and qualitative methods is a characteristic feature of studies on the Swedish tax system and the current situation in Romania. Nuță and Nuță (2018, pp. 78–83) brought to attention the qualitative aspects of fiscal illusion and consequently proposed considering the phenomenon in the fiscal sociology framework that, in their opinion, helped capture complex socio-economic relations between citizens and the State, during which both parties adopt roles and attitudes revealing fiscal illusions. The creation of the concept of fiscal sociology and the 'fatherhood' of this discipline is credited to a prominent Austrian economist, Joseph Schumpeter. He was among the first to notice strong associations between the determinants and

consequences of tax systems and all public authority and social structure policies, the institutional organisation of the state, a country's political system, culture, and history, and national traits (Campbell 1993, pp. 163–185). The fiscal sociology framework gives a convincing argument for considering fiscal illusions from a broader perspective, i.e., one including its social, sociological, cultural, and political aspects. The qualitative component of the Polish study has demonstrated that the mentality of the public and individuals should also be taken into account.

A combination of qualitative and quantitative methods, which I would advocate myself, was used by researchers studying the Swedish tax system (Sanandaji and Wallace 2010, pp. 1–11). The study was carried out by a private polling institute in the spring of 2003 with a sample of around 1000 randomly selected Swedish adults as part of a weekly phone survey. The probability of fiscal illusions occurring in Sweden is considerable because it is one of the countries with high tax rates and a large number of indirect taxes. The study showed that tax illusions may have more sources than tax invisibility alone. A person may be aware of the existence and size of a particular tax, and yet fail to recognise the incidence of its burden and thereby underestimate the total individual tax burden. The Swedish survey respondents correctly assessed the size of payroll taxes, but most of them misplaced the tax burden. Sanandaji and Wallace described a complex tax situation in which the incidence of income taxes is intentionally concealed as "fiscal obfuscation."

Abatemarco and Dell'Anno (2020, pp. 246–273) considered the problem of progressive taxation with respect to fiscal illusion and cognitive anomalies. Using econometric analysis, they validated the impact of fiscal illusion on tax progressivity in the framework of retrospective voting models and rent maximisation. Their study showed that the tax system is more (less) progressive when taxes and public expenditures are perceived less (more) and that an increase in the median voter's income may positively or negatively affect tax progressivity, depending on whether fiscal illusion is pessimistic or optimistic. Some new and very interesting aspects of fiscal illusion have recently been brought to attention in the Buehn, Dell'Anno, and Schneider (2018, pp. 1609–1630) analysis of interactions between fiscal illusion and the shadow economy. Concealing the real tax burden, they found that an increase of taxation entailed increases in shadow economic activities and fiscal illusion. Having assumed that fiscal illusion and the shadow economy were interrelated, and using a sample of 104 developed and developing countries, they demonstrated that a higher tax burden stimulated the shadow economy and indirectly incentivised the government to increase the level of fiscal illusion. A simultaneous analysis of the two latent variables (the shadow economy and fiscal illusion) for the first time indicated that the shadow economy may have a positive effect on fiscal illusion and that fiscal illusion may negatively affect the shadow economy.

A new and very interesting perspective on fiscal illusion can be found in Baekgaard, Serritzlew, and Blom-Hansen (2016, pp. 26–44). They observed that fiscal illusion is traditionally attributed to imperfect information, which inhibits the correct assessment of the costs and benefits of actions taken by public authorities and of the services they deliver. The the-

oretical, experimental model they built assumes that fiscal illusion may have more causes than limited access to information, incomprehension, or fiscal or political ignorance. They called it "an attention model" because it considers a lack of attention as one of the sources of fiscal illusion, attributing the emergence of fiscal illusion to attention effects rather than information effects. A plausibility test carried out using experimental methods produced evidence in favour of a hypothesis derived from the attention model of fiscal illusion while rejecting hypotheses derived from the standard argument. As a result, Baekgaard, Serritzlew, and Blom-Hansen concluded that the traditional assumption pointing to incomplete information as the force driving fiscal illusion was likely to be wrong. The weight they gave to the complexity of fiscal illusion and the specificity of its context makes their approach similar to the one proposed within the fiscal sociology framework.

Another interesting line of research is the study of factors that influence politicians' decisions that have some bearing on the private sector. The dominant view in this research is that politicians calculate the political costs and benefits of their decisions (Levinson 2000 pp. 345–350; 2005 p. 915; Chang 2009, pp. 541–584), because public authorities handle various costs differently than private market entities. The possibility of public-private cooperation being a source of additional fiscal illusions and higher financial costs has been recently noticed by Cepparulo, Eusepi, and Giuriato (2019). The limited transparency of public-private projects can be a source of many unforeseen financial risks and illusions. In Poland, the concept of public-private partnership is slowly being embraced, although it is frequently met with deep scepticism.

Both recent studies on fiscal illusion and those conducted in past decades are predominantly quantitative in methodology. In economic sciences, the approach is frequently necessitated by the requirement to use formalised research tools. Unfortunately, the omission of the qualitative aspects of fiscal illusion deprives its picture of vital elements and leads to results that are either inconclusive or conflicting.

The wealth of studies on fiscal illusion testifies not only to the importance and complexity of the phenomenon, but also the variety of approaches that are used to define, attribute, and quantify the phenomenon. An illustration of how complex it is might be the fact that even the quantitative research recognises as fundamental the quality of a country's democratic institutions, the level of population education, and other qualitative factors.

One of the most desirable and promising lines of research into fiscal illusions surrounding local government finances in Poland focuses on the *'flypaper effect'*. This phenomenon means that local self-governments spend more when the source of their budget funding is intergovernmental transfers than when it is locally raised revenue (local taxes and fees). In the literature, the phenomenon is commonly called the flypaper effect to indicate that '*money sticks where it hits*' (Gramlich 1977, p. 219; Gamkhar and Oates 1996, p. 501–511; Rosen 1999, p. 502). It is also referred to as an anomaly, with the tendency to spend a higher fraction of general and unrestricted grants than the income of local taxpayers (Hamilton 1983, p. 347).

Local property taxes and general grants are important sources of revenues for local self-governments, but what is most important is how local tax rates and grant formulas

are determined in practice. These solutions are fundamental for local fiscal discipline and local government performance (Dollery et al. 2020, pp. 39–225). Different types of tax autonomy (tax separation versus tax base sharing) and its impact on local spending were empirically examined by Liberati and Sacchi (2013, pp. 183–205). A direct link between fiscal illusion and the flypaper effect was indicated in the works of authors such as Julio López-Laborda and Antoni Zabalza (2012), and Hendra Kusuma (2017). A study on one of the German Länder has shown that general grants contribute to higher budget spending rather than cuts in local taxes (Langer and Korzhenevych 2018, pp. 1–36). Earlier studies, too, pointed to links between fiscal illusion and the flypaper effect. Among the various hypotheses used by researchers to empirically verify and evaluate fiscal illusion, Dollery and Worthington (1996) indicated the complexity of public revenue systems, public revenue flexibility, renter illusion, debt illusion, and, last but not least, the flypaper effect. As the reforms of intergovernmental transfers and property taxation systems can be taken advantage of by bureaucrats and local politicians to advance their own agendas, rent seeking is unlikely to be the cause of the flypaper effect in the Netherlands (Allers and Vermeulen 2016, pp. 115–129).

Fiscal illusions are a special problem for Central and Eastern European countries perceived as 'young democracies', which have launched fundamental reforms and processes to decentralise public finances. To the best of the author's knowledge, no studies have been undertaken to analyse the fiscal illusion problem in these countries in the context of local government funding sources. The problem does not go unnoticed, however. It is indirectly studied in terms of decentralisation efforts, public finance reforms, the distribution of revenues, and fiscal consolidation of the public sector (Dillinger 2007, pp. 7–9). In countries such as Bulgaria, Romania, Latvia, and the Czech Republic, public sectors have undergone a steady increase in financial decentralisation. After first attempts to assign expenditures and revenues among government levels in the early 1990s, financial self-governance began to strengthen during the subsequent decades, with a tax and revenue reform that abrogated sharing arrangements and in many cases allowed municipal councils to exercise some discretion over certain local taxes.

In some countries the reverse process took place, the legislative basis increased the share in state taxes (more than common taxes), but common taxes have been formally treated as "own" revenues. Unfortunately, many municipalities in Central-Eastern Europe did not enjoy tax autonomy at the beginning of the new millennium; but then, an action plan on fiscal decentralisation endowed many of them with a purely local taxes structure, mainly real estate tax, all kinds of property taxes, and shared taxes.

Regrettably, in many countries, fiscal decentralisation is uneven and asymmetric. In the Czech Republic, the taxing autonomy of municipalities is marginal despite the significant level of local revenues, while in Estonia, municipalities are highly dependent upon various transfers from the central government (Geisler, Hammerschmid, and Raffer 2019, pp. 30, 41, 70, 122). In the context of my considerations, one characteristic of decentralisation in Slovenia seems to be very meaningful: "Local share in revenue and spending is below the EU average. In theory, local taxes fund an essential part

of local budgets, so transfers and taxes are about even. In practice, the state regulates and collects most of them. The largest source of tax revenue is the municipal share of personal income tax (PIT), whereof a share is used for fiscal equalisation. The only tax local authorities can set the rate on is property tax. In contrast to revenue, local autonomy in spending is rather high" (Rakar and Klun 2019, p. 181). This situation is described as a straight path to fiscal illusion in intergovernmental fiscal relations.

A special case is that of Hungary, where limited decentralisation and the politicisation of local governments make "decentralisation counter-productive since it does not allow the advantages that the normative economic approach applies to prevail" (Vigvári 2020, p. 2). Similarly, the limited fiscal decentralisation and uneven progress of the participatory democracy in Romania can create and consolidate fiscal illusions (Alexandru 2018).

Conclusion

The study of Polish councillors has determined that the most probable factor that forms their attitudes and views is the inappropriate design of the local government funding system. Because it is essentially based on intergovernmental transfers, local authorities do not feel the need to assume fiscal responsibility. It has also been found that councillors in Poland have limited academic knowledge of how the system works and according to what rules local governments are financed. The reasons for the high level of fiscal illusion in the Polish system, other than the superficial financial knowledge and imperfect information, can also be what Baekgaard, Serritzlew Blom-Hansen (2016) have called "a lack of attention", as well as unawareness or absence of reflection on where intergovernmental transfers come from and who pays income taxes shared between cities.

The central government's traditional control of public finances in Poland also contributes to low fiscal and financial responsibility among local governments. It is not a specifically Polish problem, because its implications for the practice of decentralisation are noticeable in many other countries too. It essentially involves the devolution of public services (and their costs) to lower levels of government without appropriate devolvement of public revenues. Local governments are then faced with the problem of financing the increasing number of costly public services that are delegated to them because the fiscal efficiency of local taxes is low. Yet another problem is the limited fiscal autonomy of the lower levels of government in unitary countries, which arises from the need to ensure the uniformity of the tax system.

All of these circumstances lead to the establishment of local government funding systems that combine traditional general and specific grants with a significant proportion of various revenue sources, shared taxes, or tax supplements. Many national taxes are fiscally efficient, so having a share of them is advantageous for municipalities, but it may also lead to ingraining fiscal illusions in attitudes and mentality. It also breaks the direct relationship between costs (understood as the level of municipal taxes) and the range and quality of local public goods (represented by the level of expenditures).

Moreover, when the majority of municipal expenditures are not funded from local taxes, fees, and charges, local politicians have no direct fiscal responsibility towards the community. Fiscal illusions definitely have negative consequences that include the underfunding and limited range of public services, as well as poor civic participation and weak public control. The basis of rational local government funding system is the direct responsibility of local politicians for the financial and fiscal decisions they make, as well as respect for the choices of local communities and public choice theory.

The above indicates that the Polish legislation on local government funding should be amended by increasing the amount of local revenues (taxes, fees and charges) while reducing the proportion of intergovernmental transfers (grants and shared taxes). Given the high level of fiscal illusion among local authorities and their weak political will to assume greater fiscal responsibility, the amendments should aim to change the existing systemic and legislative solutions. The conclusions from the study are very important for Central and Eastern European countries in creating local government funding systems, as well as for countries aspiring to join the EU, which will undertake the decentralisation and democratisation of their state structures in the future. Of special importance is the need to avoid asymmetric decentralisation, i.e. where services and expenditures are devolved to lower levels of government without providing them with an appropriate share of public revenues and the rationality of transferring part of fiscal responsibility to local authorities.

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Iluzje fiskalne w ujęciu porównawczym: synteza wyników badań w Polsce na tle nowych podejść i badań empirycznych wybranych krajów

Przedmiotem artykułu są iluzje fiskalne w zdecentralizowanych systemach finansów publicznych. Pojawienie się bowiem w systemie niezależnego i autonomicznego ogniwa jakim są finanse samorządu terytorialnego powoduje nowe problemy. W artykule przedstawiono syntezę wyników badan empirycznych poświęconych rodzajom i zakresowi iluzji fiskalnych wśród polskich radnych, w której główny nacisk położono na aspekty jakościowe analizowanego zjawiska. Wnioski z badań poświęconych Polsce skonfrontowano z nowymi nurtami badań oraz nowym spojrzeniem na problem, które ukazały się w ostatnich latach. Celem artykułu jest usystematyzowanie dotychczasowego stanu wiedzy w kontekście wybranych badań empirycznych, sformułowanie postulatów dla praktyki i decydentów publicznych oraz wskazanie na kierunki pożądanych badań w przyszłości. W artykule wykorzystano metodę desk research oraz doświadczenia i subiektywne spojrzenie badawcze nabyte w toku realizacji projektu poświęconego iluzjom fiskalnym. W trakcie tych badań potwierdzono główną tezę, że system finansowania samorządu terytorialnego oparty na dochodach o charakterze transferów z budżetu państwa wpływa na powstawanie i utrwalanie iluzji fiskalnych.

Słowa kluczowe: decentralizacja fiskalna, iluzje fiskalne, relacje fiskalne państwo–samorząd, podatki lokalne

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A Pre Post-COVID–19 Pandemic Review of Regional Connectivity and Socio-Economic Development Reforms: What Can Be Learned by Central and Eastern European Countries from the China-Pakistan Economic Corridor

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Abstract

This paper aims to highlight the role of mutual assistance of China and Pakistan's regional connectivity through the China-Pakistan Economic Corridor (CPEC) and show what lessons can be learned by Central and Eastern European Countries (CEECs). CPEC promotes trade, FDI, peace, and sustainable socio-economic development, and it can help to alleviate the effects of COVID–19 in the region to promote socio-economic

development. In this study, we employed the Rolling Window Approach (Rolling Moving Average Approach) for data analysis of pre- and post-COVID–19. It also focuses on before and after the CPEC initiative's impact on the Pakistani economy through the Rolling Window Approach and graphical trends. In Pakistan, thanks to CPEC; trade, FDI, remittance, and the stock exchange (PSX) showed an upward shift. Terrorism decreased, which indicates a positive sign for peace and socio-economic development. However, currency depreciation increased, and the exchange rate trend is going up against the dollar, hurting the economy badly in several ways, such as the balance of payment, current account deficit, and lower some exports. To mitigate these issues, Pakistan and China have taken steps as trade formulated in domestic currency between China and Pakistan. During COVID–19, the provision of health care equipment on a priority basis from China helped to combat the COVID–19 effects and stabilize Pakistan's Economy. CPEC is structured to connect regional economic zones by forming local, regional, and global value chains. To cope with the COVID–19 impacts, socio-economic reforms and regional cooperation are suggested for CEECs with a pre-post circumstances review. Regional integration and cooperation are key to coping with this pandemic. CEECs can learn lessons from CPEC for socio-economic development, reducing violence, and improving the economy.

Keywords: China–Pakistan Economic Corridor (CPEC), exchange rate, FDI, violence, technology, socio-economic development, COVID–19 pandemic

JEL: P25, P48, R11, F36, F63

Introduction

China plays a dominant role, not only in the Asian region but also the entire world, especially after the successful quick response to and combating COVID–19, which started in Wuhan at the beginning of 2020. China is the largest country in the world population-wise, and it is becoming economically stable with an efficient financial system. According to Tambo et al. (2019), China's Belt and Road Initiative is estimated to exceed 1 trillion USD. The initiative involves more than 65 countries to link China with Asia, Europe, the Middle East, and Africa. The direct and indirect global developmental impacts can be separated into four categories: (1) Information harnessing, technology, and health, (2) Eased commerce & trade, (3) Augmented energy resource safety, (4) Improvements towards the planet.

Development is a prerequisite for economic development, and it is a by-product of the industrial growth process (Acemoglu and Robinson 2013). However, Law, Tan, and Azman-Saini (2015) said that primary sources were driven by financial reform policies, the legal system, public banks, cultural norms, and political institutions for development. In the last several decades, economic development and economic integration have been increased in parallel by enhancing investment and international trade. In light of this century's recession, there are potential opportunities to ascertain the impact of finance and integration on economic development. Abid and Ashfaq (2015)

reported that the China-Pakistan Economic Corridor (CPEC) is part of China's "One Belt One Road" initiative, and initially, the total estimated investment was $46 billion. The standing value was $62 billion, which became the highest investment from China to any integration collation partner country.

Pakistan has suffered a lot from terrorism, natural disasters (like the earthquake of 2005 or the flood of 2010), economic deprivation, and the most importantly, energy crises. Socio-economic development is the backbone of any country, which lays the road map for its success. It has been observed worldwide that countries succeed when they have sound health care and energy policies. Under CPEC, most energy projects were constructed by private independent power producers instead of government-owned projects. In the case of Pakistan, there are 14 different units of energy entities – four thermal power generation companies (GENCOs), one company managing the transmission of power (NTDC), and nine electricity distribution companies (DISCOs). The leading holding company of these units is Pepco (the Pakistan Electric Power Company).

Various energy projects in Pakistan are expected to generate electricity from fossil fuels such as coal. Of the total stake money for projects, $11 billion at the introductory level was used to develop transportation networks to create a link from Gawadar and Karachi, on the coast of the Arabian Sea in the south, to northern areas of Pakistan, and on to China and Central Asia as per Ministry of Planning, Pakistan. However, the ongoing COVID–19 pandemic effect worldwide has significantly impacted the stability, poverty, and development of developed and developing countries. For example, as stated by the Pakistan Institute of Development Economics (PIDE) in Islamabad, around 70 million of the country's population could fall below the poverty line, 18.5 million people could lose their job, and more than one million small businesses could be shuttered forever in the current perspective of COVID–19. Additionally, the economy will sustain a 2.5 trillion rupee loss in three months. Figure 1 shows the overall statistics of COVID–19 from the first case date up to May 24th, 2020.

The CPEC project has enormous importance for developing countries like Pakistan and the other linked countries and China because the route through the corridor from Gawadar is easy and, vitally, it provides the shortest access to the Middle East. The China-Pakistan economic corridor builds a connection of infrastructure, production, and trade within specific geographical urban and rural entities. This industrial corridor is structured to create domestic, regional, and global value chains to connect economic zones and hubs. The CPEC passage is not just for the transit of goods, services, and people but also for export-oriented and high tech industries (Hussain, Mehmood, and Saeed 2017). This prominent CPEC value-added project directly connects China and Pakistan (Fouzia and Aban 2018).

The Pakistani rupee has lost about a quarter of its value against the US dollar due to trade deficit, poor governance, and economic policies. Pakistan's foreign exchange reserves fell to a near five-year low of US $7.8 billion in November 2018, as reported by the state bank of Pakistan, while the net foreign reserves held by commercial banks

also dropped to US $6.4 billion. In the first week of November 2018, as the fiscal crisis loomed, the newly elected Prime Minister of Pakistan and his team visited China. The aim was to strengthen the initiatives to improve the reforms of the CPEC regional connectivity policies to take them to the next level of financial integration, and they also formulated a mechanism to trade in domestic currencies instead of the dollar.

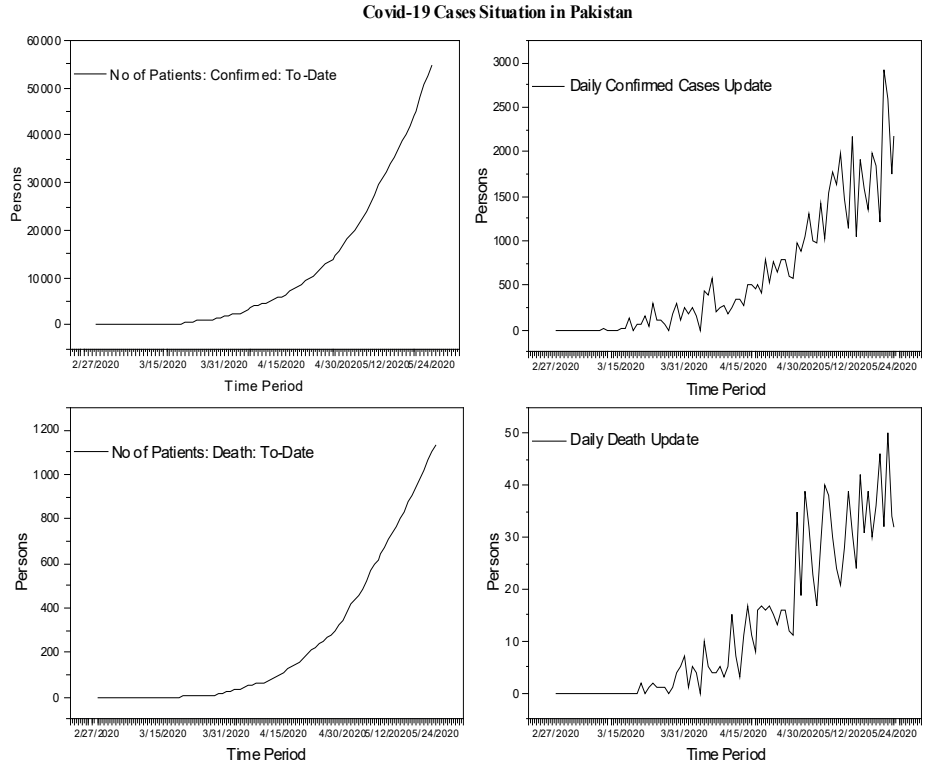

Figure 1. Covid statistics in Pakistan
Source: authors own estimation using OriginPro 2018 based on WHO and CEIC data.

Recent economic integration policies, and the relationship between both countries, increased the focus on regional connectivity, growth, sustainable socio-economic development through CPEC integration, domestic currency exchange, and better governance policies. They also raise the question of how they can mutually deal with financial crises and poverty alleviation for sustainable socio-economic stability, especially with the COVID–19 pandemic and its effects. Therefore, it is necessary to address the nexus between regional connectivity through the CPEC, socio-economic development reforms, and the COVID–19 pandemic.

The study's primary purpose is to highlight the role of China and Pakistan's mutual assistance in regional connectivity through CPEC, financial integration in trade, domestic currencies instead of the US dollar, and foreign direct investment. It also

aims to highlight the role of combating the effects of COVID–19, peace against violence, technology in Pakistan through CPEC for the transformation of expertise and advancement, as well as human and socio-economic development in the region. Moreover, it focuses on determining Pakistan's Financial Times Stock Exchange (FTSE) price index and the Pakistan Stock Exhange (PSX) formally known as Karachi Stock Exchange (KSE)–100 index trends for the era of financial crises, before and after the CPEC initiative in Pakistan. The regional development may benefit way forward in the understating of combating the COVID–19 effect.

The contribution of the study is that it shows that thanks to the CPEC initiative in Pakistan, trade, FDI, remittance, and the PSX Index showed an upward shift while terrorism decreased, indicating a positive sign for Pakistan and world peace, and social and economic development. However, currency depreciation increased in Pakistan, and to mitigate these issues, Pakistan and China have taken steps to trade in domestic currency. The results will help stabilize Pakistan's economy, but governance reforms and policies take time. CPEC provides the Chinese economy with a gateway to the world, while it helps Pakistan combat the effects of COVID–19 based on China's successful experience; CPEC also brings prosperity and peace to the region.

The study has policy implications and lessons to learn for Central and Eastern European Countries (CEECs). CEECs can learn from the experience of CPEC and other mutual assistance initiatives among the countries of the Belt and Road Initiative (BRI). This mutual assistance and cooperation among CEECs can further enhance sustainable development, reduce terrorism, promote investment and help the economy. The reduction in terrorism and enhancement in investment may improve the social well-being of the populations who share a development.

Review and background literature

Regional connectivity

Under the BRI, CPEC is a significant initiative and considered a "game-changer" for Pakistan. It aims to connect the southern port of Gwadar with the northern areas of Pakistan, and onto China, via the ancient Silk Road city of Kashgar in the far west of the country. The total distance is about 3124 km; therefore, the corridor can help to move Iraq, Iran, and Middle Eastern countries' exports of liquefied natural gas, and many more, away from the sea towards the train or pipelines. The Karot hydropower project was launched under the Silk Road Fund and cost the US $1.61 billion, funded by financial institutions and Export-Import Bank loans (Lee et al. 2017).

The primary purpose of CPEC is to enhance trading activities between China, Pakistan, the Middle East, Africa, and Central Asia (Aftab 2018). In the field of public health, immense opportunities are offered by the BRI, involving multiple countries

for partnership and collective actions to fight globalization-related emerging pandemics, infectious or chronic diseases, and outbreaks of potential threats to both health information management and laboratory information management systems. Worldwide geo-economics may improve due to strengthening the health system for public health initiatives (Tambo et al. 2019).

Concept of socio-eonomic development

The basic principle of socio-economic development (SED) is to develop by maximizing the economic potential and establishing an efficient system in the region. By necessity, SED applies a long-term perspective for promoting prosperity because the economic structures on all scales are changing, and development is related to the local situation and vice versa. Developing countries usually lack these opportunities for innovation, competition, and investment due to corruption, political instability, violence, and poor fiscal management. About 2.6 billion people live on less than $2 a day worldwide, which means that sustainable economic growth can be an essential tool. However, due to COVID–19, poverty will rise at a colossal level, and the impact will be remembered for decades, according to the e-book from PIDE on COVID–19 (2020).

Rahman et al. (2018) stated that Universal health coverage (UHC), as a global health priority, is a key objective of the Sustainable Development Goals (SDGs), which ensure the provision of superior health facilities to all citizens when they needed without financial risk. As defined by the World Health Organization, in improving health financing reform, all member countries must achieve a set of UHC targets by 2030. At least 80% of a country's population must have access to essential health-service coverage and be guaranteed protection from impoverishing and catastrophic expenses for health facilities by 2030, regardless of their gender, where they love, or economic status.

Aside from economic factors, a country should also focus on non-state actors, ethno-religious diversity, and party politics because these factors also give rise to terrorism and can damage the country (Piazza 2006). It is essential for Pakistan that it should continue its efforts to sustain peace with its eastern and western neighbors, essential for Pakistan's future security and economy. Efforts should also be made to reduce the regional disparities to bring peace within the state (Butt and Butt 2015).

Data and measurement

This study explores the impact of regional connectivity and financial integration in combating COVID–19 effects to promote socio-economic development for analysis and discussion. It also aims to discover whether before/after CPEC initiative trends are increasing or decreasing. This study discusses economic integration in domestic currencies instead of the dollar, currency depreciation trends, trade, FDI, remittances, and

Pakistan stock exchange index (PSX). This study highlights the China and Pakistan regional connectivity through CPEC to ensure the socio-economic development reforms. Additionally, we want to find out the consequences of the recent ongoing COVID–19 impacts. The monthly closing average of the year was collected from 2003 to 2019, along with the latest updated data from 2020 related to COVID–19 from reliable sources. The State Bank of Pakistan's exchange rate and stock return data were collected from the PSX website. The bilateral trade data between mainland China and Hong Kong, import, export, and GDP were gathered from the State Bank of Pakistan.

We also focus on determining the efficiency of the financial crisis-era, before and after the CPEC initiative in the Pakistan market growth and regional development benefits. The Pakistan Financial Times Stock Exchange Index (FTSE) and PSX (KSE–100 index) trend for assessing economic condition are considered in this study. Data of the FTSE index of Pakistan is collected from Data Stream. Internationally, the country suffers from a terrible image problem, and we highlight terrorism because Pakistan is included among those countries that suffer a lot from terrorist activities and bear whose economies and social growth are affected. We gathered monthly data from the South Asia Terrorism Portal (www.satp.org) to determine the trends of violence against peace and socio-economic development in the region. Terrorism data is available from 2003 to date; therefore, all data were gathered from 2003 to 2019 to determine and demonstrate the graphical trends of violence, fatalities, and socio-economic development in the region.

In this study, we employed the Rolling Window Approach (Rolling Moving Average Approach). When we measure the financial crisis's effect, CPEC efficiency, and performance on different sectors, using the monthly rolling moving average approach shows more volatility. A moving average cycle shows more profitability and helps to make investment appraisal and decision-making (Liu et al. 2017). After employing the rolling moving averages, we divided the total sample period into pre-CPEC and after integrating the CPEC initiative period. We also compare these results with the PSX (KSE–100) and Pakistan FTSE performance to discover whether these trends are consistent with stock exchange performance during this period because the stock market was also found to be affected during the global financial crisis period (Ali and Afzal 2012).

Discussion and comparison

Regional connectivity of CPEC, socio-economic development, and COVID–19 factors are discussed and compared in the following sections.

Technology and human development for Pakistan

In 1960, when technology advanced in telecommunication, computation, and data processing, transaction costs in financial services fell. It created new markets that implemented these innovations and gave long term benefits for trading (Merton and Bodie 1995). China and Pakistan's advancements in and technology and e-government rankings are shown in Figure 2. Countries are ranked from 1 (best) to 194 (worst), and Figure 2 shows that China's e-government ranking improved from 74 in 2003 to 65 in the latest report from 2018. The factors mentioned above related to human technology and human capital helped China successfully to combat the COVID–19 pandemic situation. Figure 2 also that in 2014, Pakistan ranked 158th out of 193 while in 2018, it had moved up to 148 out of 193, which indicates that four years after the CPEC initiative was implemented, it had improved by ten places; therefore, this is a good sign for Pakistan.

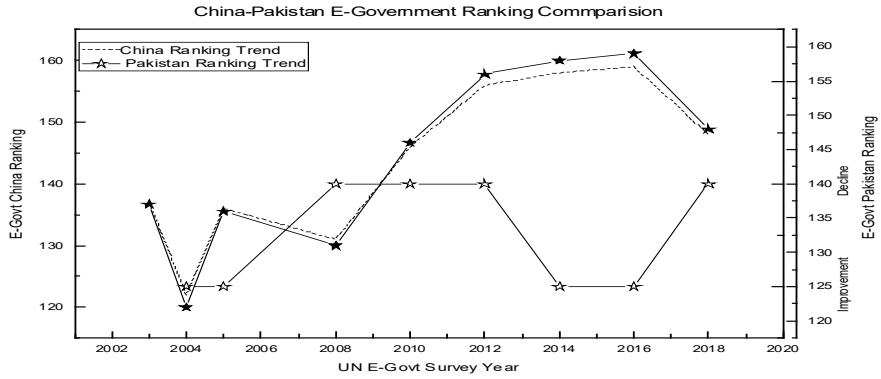

Figure 2. China-Pakistan E-Government Ranking out of 194 countries
Source: data obtained from United Nations survey reports; author's estimates through OriginPro 2018 software.

Under the CPEC economic integration, Pakistan has a chance to get maximum skills, support, and technological advancement benefits from Chinese success to develop expertise in these areas. From the economic point of view, the concept of paperless currency, like Alipay and Wechat, used in China is more beneficial for an effective tax system, control of corruption, money laundering, and other control measures related to money during emergencies like the COVID–19 lockdown. Around about 22,000 Pakistani students are in China, which is a good sign for Pakistan in human development. It will be beneficial for Pakistan's development when Chinese technologies are adopted, especially from CPEC projects. Pakistan may benefit from the latest technology of China under CPEC to successfully combat the COVID–19 effects and future sustainable development.

The establishment of technology and research programs to train human resources with China's expertise will be mutually beneficial for both countries in various fields,

such as artificial intelligence, energy, agriculture, nanotechnology, space technology, biotechnology, and management. In Pakistan, with the current pace of development under CPEC, it is estimated that Pakistan's GDP would increase by 2.5%, creating 700,000 jobs in the areas mentioned by 2030. However, due to COVID–19, the current situation is uncertain and needs an efficient model of re-assessment.

Violence against peace and development

Nowadays, violence has emerged as one of the most dangerous and destructive phenomena against global peace and security. The impetus of violence and turmoil has enhanced global issues, and it has posed severe challenges to the progressive socio-economic notions of the World. Violence has affected the whole world, and almost every state must spend a portion of its budget on counter-terrorism and terrorists. Pakistan and China have an all-weather friendship, and CPEC is a real example of that friendship. China's public management system is capable and controlled, while Pakistan can adopt reforms, management systems, and technology expertise to diminish internal terrorism and corruption for effective internal control and security.

Unfortunately, Pakistan has suffered regarding socio-economic stability and maintaining peace and security. A continuous wave of anti-state terrorism and sectarianism violence since 9/11 have resulted in protracted turmoil and intensified violence. Neighbor Afghanistan has a war link with 9/11, and there have been border skirmishes with Pakistan; therefore, the 18 years of the War on Terror resulted in massive human and economic losses.

At least 80,000 Pakistanis have killed in the war on terror, and more than 95,000 injured as per NACTA (National Action Counter Terrorism Authority) Pakistan in this so-called war against terrorism. According to NACTA, Pakistan spent estimated $123.13 billion, equivalent to PKR 10.373 trillion, on counter-terrorism measures and military operations. The number of fatalities as per the South Asia portal is shown in Table 1, while the terrorist/violence trend in Pakistan is shown in Figure 3.

Table 1. Numbers of fatalities of terrorist violence in Pakistan

	No. of Civilians	No. of Security Force Personnel	No. of Insurgents/ Terrorists	Total No. of Deaths
Total from the year 2003–2018	22,504	7,014	34,036	63,554
Total till December 2019	-	-	-	63,722

Source: South Asia Portal (December 2019).

Figure 3. Trend of violent deaths in Pakistan
Source: data obtained from South Asia Terrorism Portal (www.satp.org); author's estimates through OriginPro 2018 software.

The trend in Figure 3 supports the anti-terrorism action plan and many operations, such as Zarb-e-Azb and Karachi, against terrorists to improve the country's overall violent situations. Figure 3 also demonstrates that after 2015, there was a rapid decrease in terrorist activities and deaths, indicating that after regional connectivity through CPEC integration and strict successful measures under the national action plan, Pakistan is again a safe country. Therefore, it can now play a significant role in the development of the region. However, ongoing initiatives need to create a long-term sustainable socio-economic situation and better representation. Pakistan's economy continues to maintain its growth momentum for the 3rd year in a row, with real GDP growing at 4.56 percent in 2016, 5.37 percent in 2017, and 5.79 percent in 2018, which is the highest in eight years (Pakistan Economic Survey, 2017–2018). However, it then fell in 2019 due to financial and political instability and inadequate policies, and it will decline further due to COVID–19 effects; therefore, it needs better policies and reforms soon.

Foreign Direct Investment (FDI) and remittances

Table 2 shows that foreign direct investment increased considerably after the integration of CPEC, which positively impacted the country. However, due to the recent ongoing COVID–19 pandemic and lockdown situation, there has been a decrease in investment activities and remittances worldwide. The detailed foreign direct investment inflows between China and Pakistan are shown below in Table 2.

Table 2. Foreign direct investment from the world, mainland China, and Hong Kong (USD millions)

Financial Year	FDI Pakistan from all World	Remittances from all World	All World Total Investment into Pakistan (GDP %)	FDI from Mainland China	FDI from Hong Kong	Total FDI China + Hong Kong	Total FDI+ FPI into Pakistan from China + Hong Kong
2009–2010	531.77	3962.96	17.549	(3.6)	9.9	6.3	25.5
2010–2011	1117.26	3943.93	15.805	47.4	125.6	173	196.2
2011–2012	2200.34	4277.85	14.121	126.1	80.3	206.4	73.2
2012–2013	4272.45	5112.94	15.076	109.8	244.7	354.5	262.2
2013–2014	5590.54	5991.96	14.957	745.8	230.1	975.9	990.6
2014–2015	5436.87	7024.92	14.635	1121.6	138.0	1259.6	403.2
2015–2016	2338.36	8701.60	15.707	1108.8	95.5	1204.3	1144.3
2016–2017	2021.57	9667.15	15.686	1265.7	23.0	1288.7	1014.4
2017–2018	1326.27	12234.89	16.094	1907.2	4.9	1912.1	1635.2
2018–2019	1332.84	14597.34	–	–	–	–	–

Source: State Bank of Pakistan (FDI Inflows in USD millions from financial year July to June)

Bilateral trade, import, and exports

In this era of globalization, every country seeks export growth since exports are the economic growth engine to accelerate the development process. Through exports, local firms could achieve economies of scale, profitability, globalization, and internationalization. As an agricultural country and the world's seventh-largest producer of cotton, Pakistan's textile sector has potential. However, Ahmad, Abdullah, and Roslan (2012) said that during and after the beginning of the financial and electricity shortfall crisis, the country's textile industry shifted to India and Bangladesh, the latter's main reason for relatively liberal export incentive schemes with other countries. According to the World Bank, globally, Pakistan's exports declined to 13% from 18%. However, after completing some energy projects recently after 2018, textile and other sectors have improved.

In Pakistan, since the financial year 1981–1982, the highest single decline in exports was recorded in 2015–2016, by 13% (State Bank of Pakistan 2017). As export growth is the best strategy to overcome weak economic growth by utilizing useful projects like CPEC, Pakistan must accelerate export performance. In 2013, when China Pakistan initiated CPEC, international oil and gas prices were low, which benefitted Pakistan. Also, before and during COVID–19, oil prices were at an all-time low, which benefited both countries and will benefit China and Pakistan in the future as both countries are oil importers. Therefore, the import of oil through CPEC passage will reduce the cost and time for China. If we look at Pakistan's overall total imports and exports with all countries, the trade portion between Pakistan and China in Table 3 is significant. Due to COVID–19, there is a significant decrease in Pakistan's exports, increasing ex-

ports for economic growth and minimizing the trade deficit. Table 3 shows imports and exports increased in huge numbers after the integration of CPEC, which positively impacted the country's trade. The detail of the bilateral trade of imports and exports between China and Pakistan and the rest of the world are given in Table 3.

Table 3. Pakistan's bilateral trade with China and worldwide (USD million)

Year	% of export to China from Pak total Exports	% of import from China to Pak total exports	PK Exports to China	PK imports from China	Total Exports of Pakistan from all World	Total Imports of Pakistan from all World	Trade Balance
2003	1.88	8.25	575.11	1855.20	11714.08	13001.76	–1287.68
2004	2.00	8.30	594.78	2465.38	12943.14	17812.85	–4869.71
2005	2.27	8.44	832.80	3423.03	15916.72	25331.44	–9414.72
2006	2.73	7.69	1007.17	4240.73	16811.39	29824.72	–13013.33
2007	3.43	9.28	1105.26	5784.92	17241.37	32596.90	–15355.54
2008	3.33	7.75	1007.08	5991.41	19868.56	42131.76	–22263.20
2009	4.62	10.16	1258.68	5517.65	17313.00	31699.18	–14386.18
2010	6.07	11.45	1730.00	6941.66	21065.63	37817.45	–16751.81
2011	6.99	10.78	2122.93	8439.15	25197.34	43989.46	–18792.11
2012	10.34	11.12	3141.19	9279.08	24446.75	44156.49	–19709.74
2013	11.25	13.15	3207.07	11015.62	25052.72	44699.43	–19646.71
2014	9.61	14.96	2760.41	13248.54	24550.98	47547.03	–22996.05
2015	9.75	19.40	2478.71	16480.78	21915.17	43843.12	–21927.95
2016	7.53	21.30	1902.34	17697.83	20375.64	46845.96	–26470.32
2017	7.10	20.93	1831.70	18330.39	21503.69	57281.66	–35777.97
2018	7.46	19.15	2183.05	16968.24	23416.43	60052.45	–36636.02
2019	7.47	21.27	1950.72	15756.53	23362.62	50573.38	–27210.76

Source: State Bank of Pakistan & CEIC.

Pakistan's currency depreciation and domestic and monetary economy

Currency depreciation is primarily the loss of value of one country's currency compared to other foreign currencies. For many years, Pakistan's currency devalued many times due to worsening economic conditions and its volatility. Devaluation/depreciation is never beneficial for a country. Patro, Wald, and Wu (2014) showed significant negative abnormal returns before announcing a currency's devaluation.

After the COVID–19 pandemic, on May 12th, 2020, the exchange rate was 160.14 PKR to US $1, an all-time high value with external debt. Figure 4 shows the exchange rate trend with the US dollar between January 2003 and October 2018. It shows that an increase in the dollar rate is causing various economic hurdles for Pakistan.

Further, stock returns are significantly lower for a higher devaluation of money if it is a developing nation like Pakistan. CPEC plays a significant role in stabilizing the Pakistani economy; for example, Chinese lenders have provided 35 billion USD in loans to Pakistan for energy projects (Dasgupta 2016). Most of the projects are already completed or in the completion stage. However, Pakistan's Government reforms, significant control on corruption, and role in the appreciation of Pakistan's currency can bolster the future economy.

The mega project of CPEC can boost Pakistan's USD 274 billion economy by 15%, bringing prosperity and progress to the country, lifting the currency. Pakistan has a favorable financial situation; therefore, it makes Pakistan an emerging market that can attract more foreign investment (Abid and Ashfaq, 2015). In Pakistan's challenging economic situation, CPEC proves a game-changer, as the economic corridor can bolster Pakistan. China's currency has appreciated by approximately 33%, which is a good lesson for Pakistan to adopt effective policies like China did to appreciate its currency.

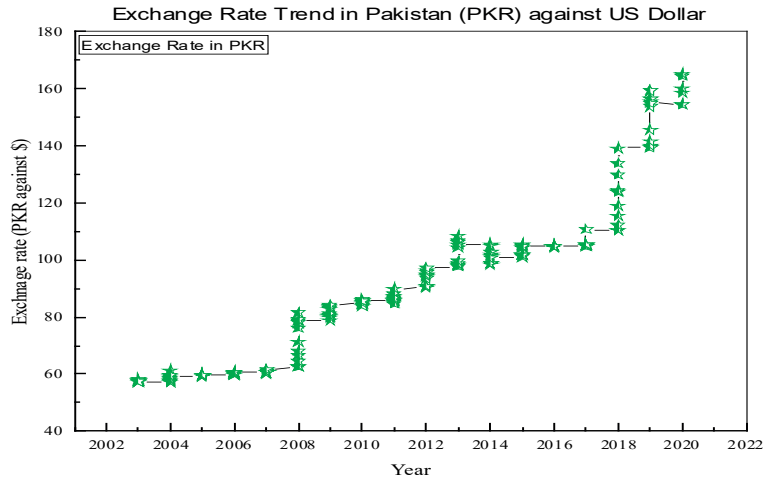

Figure 4. Exchange rate against US dollar trend
Source: data obtained State Bank of Pakistan; Author's estimates through OriginPro 2018 software.

Demonstration and comparison of economic factors

Pakistan has tried its best to cope with various factors by attracting foreign investment by making good domestic and international relations, improving the ease of doing business, and controlling the law and order situation. The yearly comparison of FDI in Pakistan shown in Figure 5 explains the above argument regarding increasing FDI in Pakistan. It has been observed during the last decade that the labor export rate has risen to 150%, which placed Pakistan among those countries that export a lot of its labor, as it is reported that Pakistan received $16.034 billion in the form of foreign remittances compared

to the previous year's $15.235, accounting for a 5.25% increase (Pakistan Economic survey). A significant portion of Pakistan's economy is based on remittances. The graphical representation is shown in Figure 5.

On December 26th, 2007, the Karachi Stock Exchange – KSE–100 index (now known as the Pakistan Stock Exchange – PSX) closed at 14,814 points, with a market capitalization of PKR 4.57 trillion ($58 billion). On January 23rd, 2009, the most noteworthy close ever of the KSE–100 stood at 4929 points, with a capitalization of PKR 1.58 trillion ($20 billion), a loss of over 65%. The KSE–100-listed securities investment rate was high during 2006–2007 but declined, with 58.3% in December 2008 (Ashraf, Arshad, and Yuancheng 2016).

Figure 6 shows that since 2003, the KSE–100/PSX index touched 45,135.9 in 2017, up from the very crippling positions in 2003 and 2009. During the financial crisis, it faced a downward situation. However, 2018 also shows a decrease due to it being an election year in Pakistan, and history demonstrates that investors decrease the trade and play it safe during this period. During 2019, there is a mixed reaction of increasing and decreasing. However, due to the COVID–19 pandemic, the PSX was down 2106 points, just moments after trading started. International markets fell more than 20 percent until the end of April 2020. The definite trend is demonstrated in Figure 6 below.

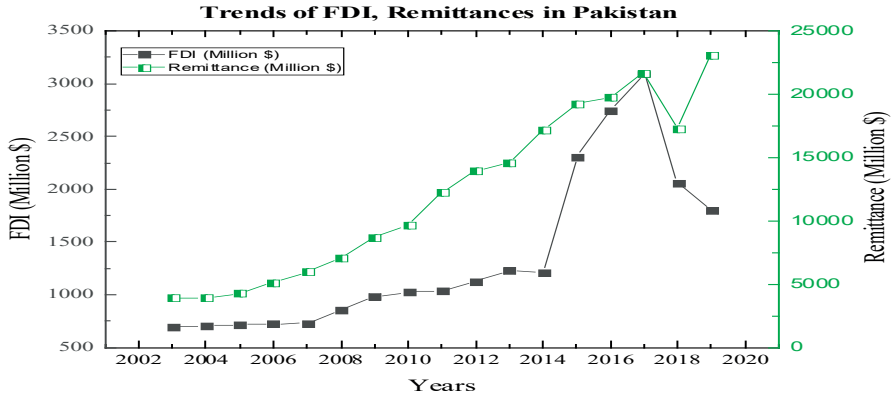

Figure 5. FDI, remittances trends in Pakistan
Source: State Bank of Pakistan; calculations by authors through OriginPro 2018 software.

After the CPEC initiative, statistics significantly influenced the stock market and social and economic development sectors, helping investors to make decisions on the more powerful ground. The rolling moving averages for daily data trends are shown in Figure 6. The graph shows improvements in performance up to 2006–2007, and then a decline in 2008; this trend was seen clearly in 2009. Although, 2007 to mid-September 2008 period is considered the financial crisis period, there was no declining trend; however, after mid-September 2008–2009, i.e., the start of the post-crisis period, the slump in the sector index may have been caused by many reasons.

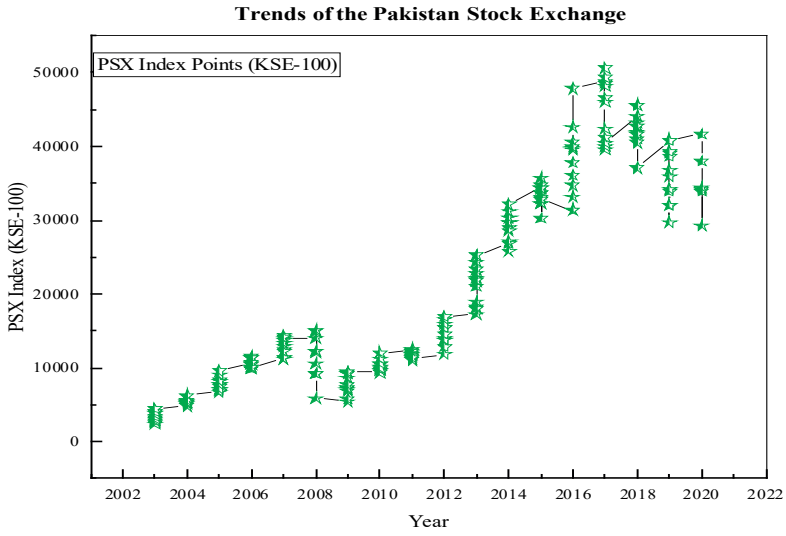

Figure 6. Trends of the Pakistan Stock Exchange (formerly known as the KSE–100 Index)
Source: Pakistan Stock Exchange Website; calculations by authors through OriginPro 2018 software.

After the CPEC initiative, the overall economy of Pakistan improved, including the stock market. Before CPEC, Pakistan suffered from political instability, and after the death of Benazir Bhutto in 2007, public violence created a significant decrease in FDI, said to be about 20%. It was also facing the after-effects of the financial crisis in 2009; investors even considered Pakistan an unsafe place. Therefore, FDI further declined to 32% in mid-2009. Several political events happened because of the ups and downs in the economy, political and justice systems instability, like General Pervaiz Musharraf's resignation and new prime ministers' appointment. The start of the energy crisis caused industry losses.

Floods are another inevitable problem faced by Pakistan, and a major flood in 2009 affected people widely, which may be why laborers could not work in factories, and thus industries faced a loss. Only the agriculture sector benefited. While the rest of South Asian economies endured an immense loss, Pakistan and India improved, as they are extensive rice exporters (Rehman, Zhang, and Ali 2014).

Pakistan's economy during the financial year 2016–2017 recorded a growth of 5.37 percent, which is the highest growth achieved since 2008–2009. Under CPEC, construction sector activities also recorded an impressive growth of 13.10 percent (Pakistan Economic Survey 2016–2017). However, after the CPEC initiative, there is an improvement and a decline because of bad policies and election-year political instability. In the ongoing COVID–19 pandemic, the Government of Pakistan allowed the construction development sector's operation at the start of April 2020 to stabilize the economy after the complete lockdown from February 26th, 2020.

Figure 7 shows the Pakistan Financial Times Stock Exchange Index (FTSE). It shows a downward trend during the global financial crisis of 2008–2009, then after the CPEC

initiative, in the year 2014–2015, an increase; however, again in recent year, there has been a downward shift because of election-year political instability and destructive policies. It is also evident that during the election year, Pakistan faced a decline in trends. The results of the 7-day moving average are shown below.

Figure 7. Trend of Pakistan FTSE
Source: Yahoo Finance.

Socio-economic development reasons and COVID–19 pandemic

The weak economy of the country resulted in a weak healthcare system, hyperinflation, and unemployment. PIDE's COVID–19 e-book (2020) stated that the COVID–19 affected employment, and about 56% of the total employment is affected in the worst-case scenario. It is feared that 125 million people will fall into poverty, and it is projected that the poverty rate will increase from 23.4% (baseline poverty) to 33.7% (in the case of the low-impact scenario), 44.2% (a medium-impact scenario), or 58.6% (a high impact scenario). A more prolonged economic recession would push these people into poverty. Poverty has risen massively, and it increased the venerability of many to illegal acts, such as crime, target killings, and mercenaries. Notably, the economic crises also raised illiteracy levels.

In Pakistan, political instability has been a significant issue in strengthening states' social and economic perspectives. The rifts between the political parties, the leftist/rightist separate ideological narratives, pursuing self-interest based policies, protests, sit-ins, and demonstration distracted the nation from a collective story of ensuring an appropriate emergency response like China, state security, and sovereignty. On the other hand, corruption contributes to havoc in the socio-economic development of the country. It is a curse and the primary obstacle to the progress of Pakistan. Moreover, it has destroyed the merit and transparency in the institutions which are crippled and hijacked by interest groups. Consequently, the lack of transparency and accountability has raised issues, such as illegal acts and crime, which impede the health care system is running, peace, and security.

Conclusion and policy inferences

Natural disasters (like the COVID–19 pandemic, earthquakes, and floods), poor governance, currency depreciation, less foreign investment, lower returns, and terrorism influence Pakistan's economy. Overall, data findings and a study of the literature show that after the CPEC Pakistani market emerged internationally. Pakistan's socio-economic development can be achieved by combating the COVID–19 effects through effectively utilizing CPEC and better reforms, policies, and governance control. Furthermore, Pakistan should focus more on self-efficiency, internationalization, regional financial integration, domestic exports, and regional development. China-Pakistan's important initiative of trade in domestic currencies will help both countries' sustainable development. Second, strategic communication can be expanded between China-Pakistan on bilateral relations and regional issues of common concern. Third, they should promote pragmatic cooperation and a friendly exchange approach worldwide. Fourth, it will strengthen coordination and cooperation in foreign and local affairs and shared prosperity in the region and globally. Pakistan's geostrategic environment can play a remarkable role in Asia.

The tremendous impact of CPEC and China and Pakistan's mutual assistance is an excellent example for CEECs. There are lessons CEECs can learn from the successful mutual assistance and cooperation. The ongoing COVID–19 pandemic has severe, direct and indirect, long-term socio-economic impacts on developed and developing countries. Pakistan is trying its best to cope with the COVID–19 pandemic. The Government announced the closure of all schools, colleges, and universities with a smart lockdown across the country, preeminent cities. Simultaneously, the Prime minister of Pakistan launched the Ehsas cash emergency program on April 1st, 2020, to ease the poor's economic hardships due to the lockdown and provide assistance not to go hungry. This program covers 12 million families, giving them 12,000 PKR each. Therefore, the total budget is PKR 144 billion.

China fought against this virus with proper planning and efficient risk management strategies that mitigated the COVID–19 pandemic. However, other countries allied with China did not learn and failed to make a profound epidemic preparedness plan by considering the Chinese situation. Pakistan did better in controlling COVID–19. Regional integration, reforms, and control through good governance discourage and alleviate money laundering because such acts discourage FDI. Tax-free economic zones should be established rapidly near highways and railway networks under CPEC to attract more foreign investors. Policies should be made to motivate the private and small-medium sectors to increase exports.

For transparency and effective utilization of regional connectivity through CPEC benefits, it is beneficial to disclose the terms and conditions of the project, which both countries have set through China and Pakistan's agreement. This will boost investors' confidence. A cost-benefit analysis is essential in the continuing period and after completing comprehensive regional connectivity through the CPEC project. In this way, policy-makers and researchers will be able to suggest the best policy options for central governments,

and it is also necessary for China and Pakistan to form a secured institutional mechanism to monitor the smooth transactions regarding investment and the pace of work in the long-term. The CPEC project is helping more, and its influence has started to reduce corruption and the lack of accountability by bringing together transparency in the merit system. However, these projects and the relationship between both countries are not limited to the above.

Pakistan is an agricultural country, so because of COVID–19, it is the right time to focus more on agriculture productivity and get support, learning, and knowledge sharing from the Chinese Government to boost Pakistan's agricultural sector. Future research should focus on the regional connectivity model of using economic zones to transform agricultural reforms and adopting an e-government system to combat the COVID–19 effects and promote socio-economic development.

CEECs are badly affected by COVID–19, and mutual assistance and cooperation like CPEC between China and Pakistan can help them respond to this pandemic appropriately. This kind of cooperation may better help them to cope with unforeseen pandemics with a joint effort and a closely monitored strategy. These initiatives also improved social development in the region and the equal distribution of resources and shared achievements. If any country is under-developed, it also affects other developed countries due to destabilization and the connectedness of issues. The present study has useful policy implications for CEECs to learn lessons from CPEC.

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Przegląd powiązań regionalnych i reform rozwoju społeczno-gospodarczego przed i po wystąpieniu pandemii COVID–19: czego mogą się nauczyć państwa Europy Środkowej i Wschodniej na przykładzie Korytarza Gospodarczego Chiny–Pakistan?

Niniejszy artykuł ma na celu podkreślenie roli wzajemnej pomocy w ramach powiązań regionalnych Chin i Pakistanu realizowanych za pośrednictwem Korytarza Gospodarczego Chiny–Pakistan (CPEC) oraz wskazanie wniosków dla państw Europy Środkowej i Wschodniej. CPEC promuje handel, bezpośrednie inwestycje zagraniczne (BIZ), pokój i zrównoważony rozwój społeczno-gospodarczy, a także może pomóc w łagodzeniu skutków COVID–19 w regionie w celu promowania rozwoju społeczno-gospodarczego. W badaniu tym zastosowano metodę „Rolling Window" do analizy danych sprzed i po pojawieniu się pandemii COVID–19. Artykuł prezentuje również wpływ sytuacji przed i po wprowadzeniu inicjatywy CPEC na gospodarkę Pakistanu za pomocą podejścia „Rolling Window" i graficznej prezentacji trendów. Dzięki CPEC, handel, BIZ, wielkość przekazów pieniężnych i indeks giełdy papierów wartościowych (PSX) w Pakistanie wykazały wzrosty. Zmniejszył się terroryzm, co jest pozytywnym sygnałem dla pokoju i rozwoju społeczno-gospodarczego. Nastąpiła jednak zwiększona deprecjacja waluty a kurs walutowy rośnie w stosunku do dolara, szkodząc gospodarce w kilku aspektach, takich jak bilans płatniczy, deficyt na rachunku obrotów bieżących

i spadek części eksportu. Aby złagodzić te problemy, Pakistan i Chiny podjęły kroki zgodnie z formułą handlu w walucie krajowej między Chinami a Pakistanem. Podczas pandemii COVID–19 zapewnienie na zasadzie pierwszeństwa dostaw sprzętu dla opieki zdrowotnej z Chin pomogło w zwalczaniu skutków COVID–19 i ustabilizowaniu gospodarki Pakistanu. CPEC został skonstruowany z zamiarem połączenia regionalnych stref ekonomicznych poprzez tworzenie lokalnych, regionalnych i globalnych łańcuchów wartości. Aby poradzić sobie ze skutkami COVID–19, państwom Europy Środkowej i Wschodniej zaleca się reformy społeczno-gospodarcze i współpracę regionalną, po uprzednim przeanalizowaniu ich specyficznej sytuacji. Integracja i współpraca regionalna mają kluczowe znaczenie dla radzenia sobie z tą pandemią. Kraje Europy Środkowej i Wschodniej mogą wyciągnąć wnioski z przykładu CPEC w zakresie rozwoju społeczno-gospodarczego, ograniczenia przemocy i poprawy sytuacji gospodarki.

Słowa kluczowe: Korytarz Gospodarczy Chiny–Pakistan (CPEC), kurs wymiany, BIZ, przemoc, technologia, rozwój społeczno-gospodarczy, pandemia COVID–19

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The Causal Link between FDI and Remittances in Kosovo, Switzerland, and Denmark

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Abstract

The pursuit of money and capital is a relentless endeavor of every economy. FDI is considered the engine of economic growth, while are remittances the increasingly the catalyst of the population's welfare. The purpose of the study is to analyze the answer about the relationship between remittances and FDI inflows in Kosovo, Switzerland and Denmark. Secondary data obtained from the World Development Indicators were, analyzed with the Ordinary Least Squares model and Granger Causality and processed with SPSS 21 technique. Measuring the correlation between variables, Foreign Direct Investment, GDP per capita growth, net migration, remittances, Gross Fixed Capital Formation, household consumption, and population number, give reliable results. Using remittances as a dependent variable, the first hypothesis has been partially confirmed, the most statistically significant and positive determinants that increase remittances are population, unemployment and migration and not other determinants. The regression results are unsatisfactory for the second hypothesis dependent variables Foreign Direct Investment the determinants are positive but not statistically significant, confirming that there are other factors that impact the increase of FDI inflows. The correlation matrix shows a high correlation between the variables. The Granger Causality model, through the Wald test, represents the cause. FDI does not cause remittances, but remittances cause FDI. A limitation of the study is the heterogeneity of the data and the countries in the sample. The results of the study will be of interest to government institutions in Kosovo to improve the business environment so that the country will become attractive to foreign investors who will bring capital and employment growth.

Keywords: FDI, remittances, panel data, OLS, Granger causality

JEL: F21, F33, E2, F24, R15

Introduction

Capital formation is essential for a country's economic development and developing economies find it difficult to secure this capital (a problem that needs to be resolved). Development economies to solve the problem of lack of capital must benefit more and more from the inflow of FDI and remittances coming from developed countries. The creation of a good employment strategy in the countries of the European Union has attracted the labor force from developing countries. The focus of the study is remittances and FDI as providers of multiple benefits, technology transfer, new employment, innovative products and services, capital stock growth and consumption. It has been shown that the use of the appropriate study model and methodology are important determinants of the degree of differences reported, especially if the sample sites are of largely different.

For many years Kosovo topped the list of the most optimistic countries in the world, according to Gallup International research although it still suffers from considerable poverty (Global Happiness and Hope Index n.d.).

Furthermore, unemployment is a significant problem that encourages outward migration (BTI Transformation Index n.d.). Denmark was the happiest country in the world in 2017 (*World Happiness Report 2021*). Denmark while Switzerland is not only one of the most beautiful places on earth, it is one of the safest and most stable countries (*Switzerland Rated One of the Safest Countries by DKV* n.d.) Denmark. If we compare their growth paths, the indicators selected in the study are important factors of revenue growth, especially for Kosovo. Remittances are expected to be statistically significant for Kosovo, with rising unemployment a problem not only internally but also externally (Switzerland faces over 50.000 Albanians who have come to this country since 1968, first from Kosovo and latter from Albania, and have been successfully integrated). The opening of legal, long-term migration routes facilitates the lives of Kosovo citizens, while daily or weekly migration to Switzerland and Denmark will increase the country's income and create satisfaction for its citizens and foreigners.

A comparative analysis of the three countries will help us to understand a lot.

Economic growth has averaged around 4% for 15 years in *Kosovo,* driven by public investment supported by consumption and remittances and less by exports. However, it has failed to reduce high unemployment and youth emigration. In 2018, Kosovo reached a GDP of $7.6 billion; however, its GDP per capita of only $4,108 is insufficient to raise the living standard of the population (Kosovo Snapshot 2019). 2019 brought only €254.6 million in FDI (CBK 2020), which contributed only 3.04% to GDP. The situation of Foreign Direct Investments it was also not satisfactory in 2020, with only €295.0 million). While the share of remittances in GDP in 2018 was 15.64% (World Bank Group 2019) continuing with this trend in 2019 and 2020 (World Bank Group 2020). Gross Fixed Capital Formation (GFCF) contributes about 16% to GDP while Household consumption increased to only 2.2% in 2018 (World Bank Group 2019).

Denmark has an economy that continues to perform well. The annual GDP per capita growth in 2018 was 0.9%, the share of FDI in GDP was 1.5%, remittances contrib-

uted only 0.4% to GDP, and GFCF annual growth was 5.1%. householdl consumption had an annual growth of 2.3%, while unemployment was low at 5.9% (World Bank Group 2019).

Switzerland has political and economic stability and efficient markets (globalEDGE n.d.). In 2018, the annual GDP per capita growth was 1.76%, FDI contributed 9.6% to GDP, remittances contributed 0.35% to GDP, and GFCF had an annual growth of 1.78%. The annual growth of household consumption was 1.04%, and unemployment was only 4.79% (World Bank Group 2019).

The aim of the research is to find the determinants that increased FDI inflows and remittances in the three countries, with the aim of stimulating the independent macro-economic variables included in the study through the fiscal favoring that the government will do to increase FDI and remittancat.

A study conducted in Central and Eastern Europe found a positive impact of both FDI and remittances on GDP, but the impact of FDI is higher than that of remittances in all countries analyzed (Comes et al. 2018). Therefore, developing countries need to work harder on promotional strategies to attract FDI because of its positive impact on economic growth (Büthe and Milner 2008).

FDI has a higher impact on economic growth than remittances because most remittances come for consumption and rather than investment. For FDI, they come in the form of capital, knowledge, and expertise, and they lead to an increase in company productivity and technology transfer from foreign to domestic enterprises (Glass and Saggi 2002; Saggi 2002). However, some believe that the impact of FDI and remittances on the economic growth of the beneficiary country is conditioned by several factors.

According to Borensztein, De Gregorio, and Lee (1998), the impact of FDI on economic growth depends on the level of education and training of the workforce. The higher the level of qualification the workforce, the more FDI contributes to economic growth. By contrast, Blomstrom, Lipsey, and Zejan (1992) claim that FDI has a strong impact on economic growth if the beneficiary country is rich, whereas the level of qualification of the workforce is not significant.

The idea that the impact of FDI on economic growth is higher in developing countries is supported by Balasubramanyam, Salisu, and Sapsford (1996). According to Mottaleb (2007), the impact of FDI on economic growth was small in countries with low GDP per capita, poor education, little infrastructure, and low trade openness. By contrast, according to Carkovic and Levine (2005), FDI does not affect the economic growth of countries, regardless of their level of development. On the other hand, Beugelsdijk, Smeets, and Zwinkels (2008) support the view that the impact of FDI on economic growth in developing countries is unclear. But one thing that is clear is that FDI increases the capital of host countries just as remittances increase the consumption of host countries.

So, after FDI, remittances represent the second-most important source of funding for a country even though there are conflicting opinions in the literature. Discussions are made whether more remittances come in the form of capital transfer or income.

Opinions differ on what impact remittances have on economic growth. Giannetti, Federici, and Raitano (2009), in a study on the eastern states of the European Union (Slovenia, Poland, the Czech Republic, and Hungary), demonstrated the existence of a link between remittances and the economic growth of the countries of origin. Barajas et al. (2009) analyzed the relationship between remittances and the level of economic growth in 84 countries in the period 1970–2004. The results show that workers' remittances have no impact on economic growth.

However, some point out that remittances increase household incomes and are therefore a powerful force against poverty in developing countries. Ratha (2013) claims that remittances positively impact the growth of incomes of the population, leading to a reduction in unemployment. A study of 71 developing countries found that a 10% increase in official international per capita remittances would produce a 3.5% drop in the share of people living in poverty (Adams Jr and Page 2005).

Some studies state that remittances tend to increase in times of economic change, political and civil crises, and natural disasters because migrants living abroad are emotionally attached to their families and are more loyal than other foreign investors. The results of a study by Mehedintu, Soava, and Sterpu (2019) found that remittances represent a relatively stable financial source for Romania and other developing countries in Europe, although their value tends to decrease, it is still though that remittances improve access to finance financial development and therefore stimulate economic growth.

However, one thing is clear. The "*brain drain*" of skilled workers is among the negative effects of remittances, and this is due to low incomes, high unemployment, and income inequality (Haller, Butnaru, and Butnaru 2018). Most studies focus on the microeconomic effect on remittance income and poverty in host countries, while the study by Bourdet and Falck (2006) focused on the macroeconomic impact of remittances on the real exchange rate in Cape Verde, by Portuguese immigrants living in USA Latin. The authors conclude that remittances create a kind of "*Dutch Disease*" effect and thus have the opposite effect on the competitiveness of the tradable sector.

In conclusion, we emphasize the need to: a) change domestic government policies that orient FDI and remittances to exports; b) limiting negative impact of remittances on the economy through the orientation of remittances for investment and not for consumption; c) eliminating the "Crowding out" effect of capital reinvestment in our home country that investors often do, and d) creating a good employment strategy in developing countries, to see the positive impact on economic growth.

Literature review

In general, remittances refer to 'money and goods transmitted to families by migrant workers working outside their home countries' (Adams 2009, p. 93; cited by Rahman and Fee 2014). However, the emigrants can transmit positive messages about the im-

age of their home country or assist investors through information about their home country. *Switzerland* is a country where a large proportion of the Kosovo emigrants work in different jobs, while Denmark is less frequented. There are major differences between these three countries in terms of economic, social, and political development, this would be an impetus for Kosovo to follow them. These differences, to the detriment of Kosovo, are reflected in the investors' decisions. Investors prefer developing countries as "*factory economy*" while themselves prefer to be the "*headquarters' economy*" that govern production networks (Baldwin and Lopez-Gonzalez 2015, p. 29, 32). With €254.6 million of FDI inflows in 2019, Kosovo is neither a "*factory economy*" nor a "*headquarters' economy*".

According to Helbling and Leblang (2019, p. 1), immigration policies significantly affect immigration flows. The effects of restrictive immigration policies decrease when the unemployment level is high Brekke, Roed, and Schone (2016), highlighted the unprecedented number of asylum seekers Europe experienced in 2015. The results of their study related to asylum seekers point out that stricter asylum policy reduces the number of new asylum seekers, while Czaika and De Haas (2016) argued that migration flows decrease as travel visa requirements become more stringent.

However, remittances are a global phenomenon older than FDI, and they are quite widespread, especially in developing, transition, and poor countries. In the study by Javorcik et al. (2011), the results suggest that FDI in the USA is positively related to migrant remittances. The data show that the relationship between FDI and migration is stronger for tertiary education migrants (Javorcik et al. 2011). Chami, Fullenkamp, and Jahjah (2003) found that remittances have a negative impact on per capita income growth, reporting three facts: 1) most remittances are spent on consumption; 2) a small portion of remittance funds goes to saving or investing; 3) part of remittances goes to the construction of houses, or land, gold ornaments, which are not productive for the economy. Basnet and Upadhyaya (2014) used data for 35 middle-income countries from Latin America, Asia-Pacific, and Africa. The estimated results give no importance to remittances in attracting FDI when all regions are included. However, when the estimates are done according to geographical division, remittances positively affect African countries, no significant effects on Latin American countries, and a negative effect on the Asia-Pacific region. Coon and Neuman (2016), in their study of a panel of 118 countries between 1980 and 2010 using the Random Effects model, found a positive and significant effect of FDI inflows on remittances. They also found a strong relationship with low-income countries. Buch and Kuckulenz (2010) found that remittance shipments respond more to demographic variables, while private equity flows respond more to macroeconomic conditions.

The greatest effects of remittances are on reducing poverty through increased consumption. The effects of remittances in Kosovo are positive even though active workers are being lost every day, but we suffer from low FDI.

The a objectives, hypotheses, and approach to the study model

The objective of this study, is to identify the determinants of Foreign Direct Investment and Remittances in Kosovo, Switzerland and Denmark.

The objectives extend even further:

- To analyze the current trend of FDI inflows and remittances to Kosovo, Switzerland, and Denmark;
- To analyze the relationship between Foreign Direct Investment, GDP per capita growth, gross fixed capital formation, household consumption, population size, and growth of remittance inflows in Kosovo, Switzerland, and Denmark (correlation between variables);
- To measure the impact of FDI, GDP per capita growth, GFCF, household consumption, migration, and population size on the growth of remittances in Kosovo, Switzerland, and Denmark and vice versa – the impact of these variables on FDI.

Hypothesis H1: The remittance flow growth in Kosovo, Switzerland, and Denmark depends on FDI inflow growth, GDP per capita growth, GFCF, household consumption, and the population size in these countries.

Hypothesis 2: The growth of FDI inflows in Kosovo, Switzerland, and Denmark depends on Remittances, GDP per capita growth, GFCF, household consumption, and population size in these countries.

Hypothesis H3: The relationship between FDI, remittances, net migration, GDP per capita, GFCF, household consumption, and population size in Kosovo, Switzerland, and Denmark is positive.

The approach to the study model: To make this study more interesting, the variables selected are those that highlight these differences through combining countries with different levels of development.

The following variables are included in the hypothesis:

- Dependent variables in the two equations: Remittance (REM), dependent (H1); FDI, dependent on equation (H2).
- Independent variables: Unemployment (UN); GDP per capita (GDPpc), Net migration (NM); Gross Fixed Capital Formation _ annual growth (GFCF); Household Consumption _ annual growth (HC); Population size(PS).
- The relationship between variables was also measured (H3).

The panel of 3 countries was evaluated for the period 2004–2018, using the Ordinary Least Squares (OLS) and Granger Causality (GC) models, with follow-up tests to increase the study's reliability.

To test the hypotheses, the estimation was done through the model in Eq. 1, Eq. 2, and Eq. 3, obtained in the paper by Coon and Neumann (2016, p. 9):

$$\text{Rit} = \beta 0 + \beta_1 \text{FDI}_{it} + \beta_2 \text{ Net migration }_{it} + \Gamma Z_{it} - 1 + \Phi X_{it} + \epsilon\epsilon_{it} + u_i, \qquad (1)$$

where R_{it} stands for the remittances sent by country (i). FDI is FDI net inflows to countries in year (t); emigration is net migration in the country; Z is a vector of the three variables related to the unemployment rate in the country, population size, and GDP per capita growth (annual %).

Equ. (1) also includes X_{it} as a representative of the additional control variables as determinants of remittances such as Gross fixed capital formation and household consumption.

In the empirical model (Eq. 2), remittances are a dependent variable. Considering the migrants' proximity to foreign investor partners, FDI is placed in the second hypothesis (Eq. 3), while the other variables are independent.

Measuring the relationship between these variables was considered necessary. Thus, to identify the causal direction between these variables, the Granger model (Granger 1969) and the following Vector Auto Regression (VAR) framework were used in a panel proposed by Holtz-Eakin, Newey, and Rosen (1988), cited in Coon and Neumann (2016, p. 10), modified by several variables (population size, unemployment, GFCF, net migration, and household consumption) smilar to Pesaran, Shin, and Smith (2001, pp. 303–304), who used the following model to see whether the relationship between variables is present to reject the null hypothesis:

$$R_{\{i,t\}} = ai \ \sum_{k=1}^{p} Yk^{R} + ,t{-}k\} + \sum_{k=1}^{p} Bk^{FDI} \{i, t-k\} + {}_{,t} \tag{2}$$

$$FDI_{\{i,t\}} = ai \ \sum_{k=1}^{p} Yk^{FDI} + ,t{-}k\} + \sum_{k=1}^{p} Bk^{R} \{i, t-k\} + {}_{,t} \tag{3}$$

H0: $\theta 0 = 0$, against H1: $\theta 0 < 0$; H0: $\beta k = 0$, $\forall k = 1$, in favor of the alternative hypothesis H1. H1: $\beta k \neq 0$.

The results of equations (2) and (3) are estimated with the OLS model, which measures the impact of all above-mentioned variables on remittances as a dependent variable in equation 2, and the impact of the same independent variables on FDI dependent variable in equation 3.

The Granger causality test, based on the Wald relevance test, was used to determine the direction of a causal relation between Foreign Direct Investment (FDI) and Remittances (REM) and vice versa. It also measures the relationship of FDI and remittances separately with other control variables, Population size (PS), Unemployment (UN), Gross Fixed Capital Formation (GFCF), Net migration (NM), and Household Consumption (HC). The data for the empirical econometric analysis were obtained from World Development Indicators (WDI) and are in US$. The data are annual, from 2004–2018. Migration is measured as the number of people at the end of the year that migrated abroad from country (i). For the variables presented earlier, we have (k + 1) = 8 variables. The SPSS 21 technique was applied to all tests, including the testing of the Granger Causality model.

The results of the study

The descriptive statistics of the panel data in Table (1) provide a statistical summary of the mean distribution of each variable according to the analyzed OLS model. The data include macroeconomic variables included in the model. It also includes the number of observations for each variable, mean, distribution from the mean, and the minimum point that make the interval around which the variables' values fluctuate. From the table, we draw the following conclusions:

First, the model finds that the variable values of the annual GDP per capita (GDPpc) around the mean are more concentrated than the other variables because the value distribution is 2.05 units out of the mean 1.72 units; this distribution is the lowest.

Table 1. Derscriptive statistics (WDI, 2019, US$), 2004–2018

Variable	Obs	Mean	Std.	Dev.	Min
PS	45	5094558	2571530	1704622	8516543
GDPpc	45	1.727301	2.057824	–5.413992	6.427747
FDI	45	3.862642	5.073199	–9.592785	16.82878
REM	45	5.814232	7.874408	.2518616	20.03687
GFCF	45	3.943085	6.877594	–13.63129	28.86522
UN	45	16.23625	16.04212	4.1161	47.5
HC	45	2.99047	3.338539	–3.432123	12.98892
NM	12	133627.6	147603.3	–16381	397267

Note: Results are obtained by SPSS 21
Source: all tables and figures in the study were compiled by the author.

The second best variable by distribution after the annual GDP per capita growth is the Household Consumption (HC). It has an average of 2.99 units with an average distribution of 3.38 units, indicating that even in this case, the distribution is concentrated during the period of analysis. In FDI, the value distribution is 5.07 units out of an average of 3.86 units. This indicates that these variables have a concentrated distribution throughout the analyzed period (2004–2018). In (GCFC), the distribution of values is 6.87 units out of an average of 3.94 units.

This indicates that these variables have a concentrated distribution throughout the analyzed period (2004–2018).

The same conclusion is also reached for the unemployment and remittances variables, but not for population (an average of 5094558, with a high standard deviation of 2571530) and migration (an average of 133627.6 with a standard deviation of 147603.3), for which tests of the normal distribution of the average will be performed. The above findings help us to conclude that further interpretation of the variables by the econometric model will be highly reliable because the values of their variables have a concentrated distribution around the average. From the above results, we see significant differences between the countries included in the research, in all the factors involved

Based on the descriptive analysis (supplementary annex, tables 1a), the results presented are for the economies of the three countries. The average GDP per capita, FDI, and remittances in Switzerland as an absolute value are higher than in Kosovo. However, if measured as a percentage of GDP, for 15 years, Kosovo has led with remittances, from 15 to 20%. Kosovo has the highest unemployment rate (maximum 46.3% in 2007 and minimum 27.31% in 2018) between the three countries, while both Switzerland and Denmark have low unemployment rates (from 4.1% to 4.9% in Switzerland, and from 5.5% to 7.2% in Denmark) between 2004 and 2018.

The household consumption statistics as a % of GDP are interesting. Kosovo has a higher household consumption in 2004 of 13% and the lowest of 2% in 2017. In Denmark, household consumption is at a relative minimum value of 0.27% of GDP and a maximum of 4.6%, while Switzerland ranges from 1.1 to 2.6%. This means that the economy of Kosovo grew mostly from household consumption and remittances, which is a short-term growth. By comparison, the long-term growth in Switzerland and Denmark is through other indicators and less from remittances and household consumption. Both migration and unemployment variables make Kosovo first place compared to the two countries under study.

The results of the econometric evaluation are presented starting with the descriptive statistics in Annex A – Table 1a, the OLS method – Tables 2, 3, 4, 5, and 6, and Granger Causality – Tables 7 and 8. In Annex B, Tables 1b and 1c, the Anova One Way test is used to compare the three countries in terms of FDI and Remittances, and the Granger Causality test is in Table 8a.

In Appendix B, Table 1b measures the difference between the three countries regarding FDI and shows there is a statistically significant difference between the three countries ($F = 5.49$, p-value = .007 < 0.1%). Differences were found between Kosovo and Denmark (MD = 5.2876, p-value = .009), and between Denmark and Switzerland (MD = 4.23212, p-value = .048), but no significant differences were found between Kosovo and Switzerland (MD = –1.05465, p-value = .900).

In appendix B, Table 1c is measures the difference between the three countries regarding Remitances. It shows that there are no statistically significant differences between the three countries in terms of REM ($F = 970.25$, p-value = 0.000), between Kosovo and Denmark (MD = 16.3605, p-value = .000), between Kosovo and Switzerland (MD = 0.037888, p-value = .1000), or between Denmark and Switzerland (MD = –16.3226, p-value = 0.00).

Ordinary Least Squares (OLS) model

Ordinary Least Squares (OLS) analysis was used to determine the statistically significant difference between the three countries (Tables 2, 4, and 5). The following results show that a significant statistical difference was found in all variables, except for Gross fixed capital formation.

Table 2. The Anova Test

		Sum of Squares	df	Mean Square	F	Sig.
Population, size	Between Groups	288,671,108,231,232.800	2	144,335,554,115,616.400	2,646.517	0.000
	Within Groups	2,290,593,214,230.268	42	54,537,933,672.149		
	Total	290,961,701,445,463.060	44			
GDP per capita growth (annual %)	Between Groups	60.215	2	30.107	10.027	0.000
	Within Groups	126.109	42	3.003		
	Total	186.324	44			
Foreign direct investment, net inflows (% of GDP)	Between Groups	234.865	2	117.432	5.495	0.008
	Within Groups	897.578	42	21.371		
	Total	1,132.443	44			
Remittances, received (% of GDP)	Between Groups	2,670.478	2	1,335.239	970.252	0.000
	Within Groups	57.799	42	1.376		
	Total	2,728.277	44			
Gross fixed capital formation (annual % growth)	Between Groups	202.112	2	101.056	2.259	0.117
	Within Groups	1,879.146	42	44.742		
	Total	2,081.257	44			
Unemployment (% of total labor force)	Between Groups	10,486.053	2	5,243.026	262.988	0.000
	Within Groups	837.328	42	19.936		
	Total	11,323.381	44			
Households consumption (annual % growth)	Between Groups	194.042	2	97.021	13.749	0.000
	Within Groups	296.375	42	7.057		
	Total	490.417	44			
Net migration	Between Groups	226,219,854,058.967	2	113,109,927,029.483	75.775	0.000
	Within Groups	13,434,333,970.682	9	1,492,703,774.520		
	Total	239,654,188,029.649	11			

Source: World Development Indicators (WDI), author's own elaboration.

In Table 3, the normality test was performed.

Table 3. The test normality

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Population size	0.223	12	0.103	0.853	12	0.039
GDP per capita growth (annual %)	0.167	12	0.200*	0.946	12	0.581
Foreign direct investment, net inflows (% of GDP)	0.216	12	0.127	0.943	12	0.536
Remittances, received (% of GDP)	0.414	12	0.000	0.650	12	0.000
Gross fixed capital formation (annual % growth)	0.352	12	0.000	0.732	12	0.002
Unemployment (% of total labor force)	0.374	12	0.000	0.729	12	0.002
Households consumption (annual % growth)	0.252	12	0.034	0.727	12	0.002
Net migration	0.239	12	0.058	0.858	12	0.047

* This is a lower bound of the true significance. [a.] Lilliefors Significance Correction.
Parametric data: p > 0.5%; Nonparametric data: p < 0.5%.

Source: World Development Indicators (WDI), author's own elaboration.

The impact of independent variables on the dependent variable, Remittances, is tested to reach a final conclusion:

Hypothesis H1: The remittance flow growth in Kosovo, Switzerland, and Denmark depends on FDI inflow growth, GDP per capita growth, Gross fixed capital formation, household consumption, and population size in all countries.

The results in Table 4 below show that there is a positive relationship between remittances and unemployment, (β = 0.731, p = .013, p < .05%), which means that statistically, the growth of remittance flows in Kosovo, Switzerland, and Denmark is affected by rising unemployment

Empirical equation:

$$R_{\{i,t\}} = \text{cons } 0.023 - \text{PS.it } .962 + \text{GDPpc.it } 0.721 - \text{FDIit } 0.197 - \text{GCFCit } 0.045 + \text{UNit } 0.364 - \text{HCit } 0.258 + \text{NM.it. } 1.64 \quad (2a)$$

There is a close but statistically insignificant impact or population size (β = −0.649, p = .071, p > .05%) and net migration (β = 0.302, p = .093, p > .05%), while in other cases, the statistics are insignificant and the coefficients are negative, such as GDP per capita growth (β = 0.107, p = .169, p > .05%), Foreign direct investment (β = −0.116, p = .278, p > .05%), Gross fixed capital formation (% GDP) (β = −0.048, p = .588, p > .05%) and household consumption (% GDP) (β = −0.110, p = .192, p > .05%). From another point of view, the correlation of these factors has a positive relation in general with remittances (rho = .996, R2 = .993, p-value = .000, p < .01%), i.e., it is statistically significant at the 1% level of confidence.

The growth of remittance flows in Kosovo, Switzerland, and Denmark depends largely on high unemployment and partly on population growth and migration growth.

Table 4. The Coefficients

Independent variables	Model (1)			
	Beta	S.H.	β	Sig.
Population size	–1.962E–6	0.000	–0.649	0.071
GDP per capita growth (annual %)	0.721	0.430	0.107	0.169
Foreign direct investment, net inflows (% of GDP)	–0.197	0.157	–0.116	0.278
Gross fixed capital formation (annual % growth)	–0.045	0.076	–0.048	0.588
Unemployment (% of total labor force)	0.364	0.085	0.731	0.013
Households consumption (annual % growth)	–0.258	0.165	–0.110	0.192
Net migration	1.640E–5	0.000	0.302	0.093
R	0.996			
R^2	0.993			
ΔR^2	0.979			
F	76.074			
ANOVA (Sig.)	0.000			
Dependent variable: Remittances (% of GDP) cons., 0.023				

Source: World Development Indicators (WDI), author's own elaboration.

The second hypothesis is tested below, where it measures the impact of the independent variables on the dependent variable, Foreign Direct Investment:

Hypothesis 2: The growth of FDI inflows in Kosovo, Switzerland, and Denmark depends on Remittances, GDP per capita growth, Gross fixed capital formation, household consumption, and population size.

Empirical equation:

$$\begin{aligned} FDI_{\{i,t\}} = \text{cons } 0.197 - \text{GDPpc.it } 5.207 + \text{REM it } 0023 - \\ \text{GCFCit } 1.437 + \text{UNit } 0.091 + \text{HCit } 0.43 - \text{NMit. } 0.503 \end{aligned} \quad (3a)$$

FDI – the dependent and other independent variables (Table 5). Based on the results below, we can state that there were no cases with any significant and positive effects on p-value and coefficients in the variables of GDP per capita growth (β = -.2.192, p = .313), Remitances (β = .006, p = .949), Gross fixed capital formation (β = –2.431, p = .270), Unemployment (β = .164, p = .723), Households consumption (β = 1.467, p = .287) and Net migration (β = –0.362, p = .320). Meanwhile we have a high positive correlation of .919, but it is not statistically significant (p-value = .146).

From these results, we can say that the growth of FDI inflow in Kosovo, Switzerland, and Denmark does not depend on Remittances, GDP per capita growth, Gross fixed capital formation, household consumption, or population size it depends on other factors not explored in this study.

Table 5. The Coefficients

Independent variables	Model (2)			
	Beta	S.H.	β	Sig.
GDP per capita growth (annual %)	–5.207E–6	0.000	–2.912	0.313
Personal remittances, received (% of GDP)	0.023	1.517	0.006	0.949
Gross fixed capital formation (annual % growth)	–1.437	1.145	–2.431	0.270
Unemployment (% of total labor force)	0.091	0.210	0.164	0.723
Households consumption (annual % growth)	0.432	0.499	1.467	0.287
Net migration	–0.503	0.506	–0.362	0.320
R	0.919			
R^2	0.844			
ΔR^2	0.571			
F	3.093			
ANOVA (Sig.)	0.146			
Dependent variable: Foreign direct investment, net inflows (% of GDP) cons., 0.197				

Source: World Development Indicators (WDI, 2019), author's own elaboration.

In the correlation matrix in Table 6, we find that the correlation between variables, and between population and other variables, has a high negative but statistically significant correlation.

Table 6. The correlation matrix between variables

Variable	PS	GDPpc	FDI	REM	GFCF	UN	HC	NM
PS	1							
GDPpc	**–0.512****	1						
	0.000							
FDI	–0.149	0.187	1					
	0.330	*0.219*						
REM	**–0.913****	**0.582****	**0.324***	1				
	0.000	*0.000*	*0.030*					
GFCF	–0.284	**0.519****	0.214	**0.346***	1			
	0.059	*0.000*	*0.159*	*0.020*				
UN	**–0.906****	**0.557****	**0.333***	**0.981****	**0.374***	1		
	0.000	*0.000*	*0.025*	*0.000*	*0.011*			
HC	**–0.580****	**0.598****	0.195	**0.675****	0.142	**0.638****	1	
	0.000	*0.000*	*0.200*	*0.000*	*0.351*	*0.000*		
NM	**0.887****	–0.342	–0.546	**–0.683***	–0.408	**–0.687**	–0.420	1
	0.000	*0.277*	*0.066*	*0.014*	*0.187*	*0.014*	*0.174*	

Standard errors in parentheses; * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$
Source: author's own elaboration.

In the first case, we see that the correlation between population size and GDP per capita growth is statistically significant but negative (rhi = - 0.512**, p-value = .000). The same is true for remittances (rho = -.913**, p-value = .000), and Unemployment

(rho = -.906 **, p-value = .000). The relationship between population and households consumption (rho = –0.580**, p-value = .000) is negative but statistically significant, while the correlation between population and migration is statistically significant (rho = 0.887 **, p-value = .000).

GDP per capita growth has a positive and statistically significant correlation with remittances (rho = .582**, p-value = .000), gross fixed capital formation (rho = .519**, p-value = .000), unemployment (rho = .557**, p-value = .000) and households consumption (rho = .598**, p-value = .000). There is a positive and statistically significant relationship between Foreign Direct Investment, net inflows with rremittances (rho = .324**, p-value = .030) and Unemployment, (rho = .333**, p-value = .025), which means the higher the volume of inflows of FDI, the higher the remittances and the lower the unemployment in the country. Remittances have a positive and significant relationship with Gross fixed capital formation (rho = .346**, p = .020), unemployment (rho = .981**, p-value = .000) and households consumption (rho = .675**, p-value = .000). So, high remittances help the fixed capital, reduce unemployment, and increase households consumption. The negative and statistically significant correlation of remittances with migration (rho = -.683**, p-value = .014) means that the more remittances the migrants bring in, the less their family members emigrate.

Granger Causality test model

Since all the series are integrated in the same order, which is a necessary condition for standard testing of integration (Engle and Granger) to be measurable, we note that the two hypotheses are not rejected: Remittances bring FDI.

Hypothesis H3: The relationship between FDI, remittances, net migration, GDP per capita, GFCF, household consumption, and population size in Kosovo, Switzerland, and Denmark is positive.

Table 7. Granger Causality (Wald test statistics)

Equation	Excluded	F	Df	Df_r	Prob-F	R-sq	P – F	Decision
GDPpc	REM	.09752	1	10	0.7612	0.7612	.608	Reject
GDPpc	FDI	.47359	1	10	0.5070			
GDPpc	ALL	.24426	2	10	0.7878			
Remittance	GDP	1.2088	1	10	0.2973	0.8166	.000	Accept
Remittance	FDI	2.1363	1	10	0.1746			
Remittance	ALL	1.4411	2	10	0.2819			
FDI	GDP	.99772	1	10	0.3414	0.2543	.393	Reject
FDI	REM	1.5369	1	10	0.2434			
FDI	ALL	1.5145	2	10	0.2664			

Source: author's own elaboration.

The Wald test Was also performed, and the final values show a one-way correlation – remittances bring FDI while FDI does not bring remittances.

Table 8. Granger Causality (Wald test statistic) [$X^2$0.05 = 0.996 (3df)]

Ha: FDI not causes Remittances	R^2	Ha: Remittances cause FDI	R^2
0.393**	0.555	0.000**	0.996

Source: World Development Indicators (WDI, 2019), author's own elaboration.

Discussion of the study results

It began from the descriptive statistical analysis to estimate the distribution of values in units from average to unit, as well as the measurement of minimum values. The multiple regression performed with the OLS model measured the impact of independent variables on the dependent variable, in the first case the dependent FDI while in the second case the remittances are presented as the dependent variable. Correlation analysis measured the relationship between variables. The Granger Causality model (1969) was applied to measure the cause of the relationship between variables. The panel results show that there are very large differences between countries, and tha all variables have important statistical significance except CGFC. The normality test was also performed (Table 3).

As we can see from Table 4, regarding hypothesis 1, migrant remittances are the dependent variable, all other variables are independent. The results of the analysis found a positive relationship between Remittances and Unemployment, ($\beta = 0.731$, $p = .013$, $p < .05\%$), which indicates statistically that unemployment has an increasing impact on remittances to Kosovo, Switzerland, and Denmark. Population growth ($\beta = -0.649$, $p = .071$, $p > .05\%$) and migration ($\beta = 0.302$, $p = .093$, $p > .05\%$) have a close but statistically insignificant impact on remittances. Meanwhile, GDP per capita growth (annual %) ($\beta = 0.107$, $p = .169$, $p > .05\%$), FDI ($\beta = -0.116$, $p = .278$, $p > .05\%$), GFCF (annual % growth) ($\beta = -0.048$, $p = .588$, $p > .05\%$) and Households consumption ($\beta = -0.110$, $p = .192$, $p > .05\%$) did not affect the remittance inflow growth.

As we can see from Table 5, for Hypothesis 2, FDI dependent variables – based on the results, we can say that there were no cases with any positive effects on coefficients and p-value, although there was a high positive correlation of $R^2 = .919$, but a not statistically significant p-value = .146. From these results, we can say that the growth of FDI inflows in Kosovo, Switzerland, and Denmark does not depend on remittances, GDP per capita growth, Gross fixed capital formation, household consumption, migration, or population size. It is estimated that the statistically insignificant effect of the independent variables on the attraction of FDI flows as a dependent variable is related to the theoretical FDI framework that not all economic indicators attract FDI. However, the Kolmogorov-Smirnov and Shapiro-Wilk normality tests show that population, GDP per capita, and FDI are statistically insignificant although positive, which means that there are other indicators that have not been analyzed that may attract FDI. This indicates that sample countries have large variations in these variables due to the specific economic conditions of each country.

From another point of view, these factors have a positive correlation in general with remittances (rho = .996, R^2 = .993, p-value = .000, p < .01%). So, statistically, at the 1% level of confidence, the remittance flow growth in Kosovo, Switzerland, and Denmark is statistically significant, being largely dependent on unemployment and partly dependent on FDI inflow growth, GDP per capita growth, Gross fixed capital formation, household consumption, migration, and population size. The high unemployment rate in Kosovo has influenced the results of the study, which presents the unemployment variable as the key factor that attracts remittances to the three countries grouped as a sample.

In the empirical analysis, Adenutsi (2014) included 36 countries for the period 1980–2009. It was found that the flow of employee compensation and employee remittances is affected by the macroeconomic conditions of the host country. This is similar to our study, where the high level of remittances in Kosovo results from the low level of economic development, migration, and high unemployment there. These factors influenced the results of the study despite the developed countries being included in the sample. Also, our results are somewhat similar to the results of Palamuleni (2018), who showed that remittance flows have small, positive effects on FDI that vary by region and country. In particular, positive relationships are strong in African countries and countries that receive high shipments, but not for Asian and Latin American countries. While it is contrary to our results, the causality test suggests a two-way relationship. in our study, FDI does not cause remittances; remittances cause FDI.

As we can see from the Granger Causality test in Table 7 and the Wald test in Table 8a (in Annex B), the third hypothesis is upheld, further reinforcing the belief that remittances bring in FDI (R^2 = 0.0996 and p = 0.000). While Foreign Direct Investment not statistically significant (R^2 = 0.555 and p = 0.3380), to bring remittances to Kosovo, Switzerland, and Denmark.

Conclusions

The research finds that the remittance inflow growth in Kosovo, Switzerland, and Denmark, as shown in equation (2), does not depend on FDI, GDP per capita, or GFCF; it depends on unemployment, population size, and migration. The FDI inflow growth, as shown in equation (3), also does not depend on the study variables. There are other factors that drive FDI flows in these three countries. In the matrix in Table 6, GDP per capita growth is negatively correlated with population size; the more the population grows, the lower the GDP per capita. Remittances are statistically significant but negatively correlated with the population, while they are positively correlated with robust statistical significance with GDP and FDI.

Another positive correlation is the domestic investment with GDP and remittances. Unemployment has also been shown to be statistically significant but negative. lastly, household consumption has a statistically significant but negative relationship with

population size, while there is a positive and statistically significant relationship with GDP per capita, remittances, and unemployment. In Kosovo, 16% of GDP is supplemented by remittances, making migrants a short-term stabilizing factor to the economy. In the future, they can also be considered attractive to foreign investors, either throughpartnerships or through the social relations they have created. In 2018, the remittances brought to Switzerland were 0.35% of GDP; in Denmark, remittances brought in were only 0.38% of GDP the same year. Even from the descriptive analysis results, it is clear that remittances are still decreasing in countries with political, financial, social, and economic stability.

This is confirmed by analyzing the results. Low remittances, low unemployment, and rising FDI in Denmark and Switzerland did not change the statistical significance of the study variables. With a greater variety of data sets, the differences between with countries are clearly expressed and this is made possible by the technique of econometric evaluation and specification, and even the list of regressors included in the equation created the reliability of the results.

So, when there are differences between countries (such as Kosovo), in the short term, they cannot catch up with countries like Denmark and Switzerland. It is seen that not all variables are selected as appropriate for each country, which is a limitation of the study. Also, the non-inclusion of some demand-side determinants like labor cost, distance cost, literacy rate, and political stability, and some of the supply-side determinants like economies of scale or product life cycles, is a limitation of the study. The inclusion of annual data covering only a short period (2004–2018) is a further limitation.

However, our results are reliable and directly comparable using the OLS method in evaluating cross-section data by eliminating the errors that accompanied the data, as well as any correlation (heteroskedasticity) that may be present between observations (see Gorg and Strobl 2001). The use of different models (OLS, Granger Causality) and the combination of results have provided more explanatory power than if we were simply to use only one type of econometric estimation (see Stanley 2001).

In Kosovo, Denmark, and Switzerland, where the values of the Remittances and FDI threshold are with great differences, the impact of Remittances is insignificant in attracting FDI while they are highly correlated between them, an innovation of this study. This result is influenced by both Denmark and Switzerland because remittances are low. Kosovo has a high growth rate of remittances (every year, on average, over €800 million of remittances come to Kosovo), with 22.5% of total remittances coming from Switzerland alone (CBK 2018, p. 35). For 20 years, it has promoted economic growth. This increase in remittances in Kosovo has not yet brought foreign investors to Kosovo (it did not exceed €470.4 million of FDI in 2007). In countries such as Denmark and Switzerland, where remittance rates are low, the impact on economic growth is not significant, and thus it is not a factor in economic growth.

The other innovation of this study is that it combines three diametrically opposed countries with these variables, which has never been done before.

Such a combination highlighted the importance of FDI and remittance determinants in developing and developed countries. A positive trend of remittances is expected to be in the next decade, based on the global size of the remittance market in 2018, estimated at $682.6 billion; forecasts are that they will reach $930.44 billion by 2026 (Allied Analytics LLP 2020).

The results of this study will be of interest to Government institutions in Kosovo to improve the business environment, and stimulate capital growth and employment with more professionally qualified workers to be attractive to foreign investors.

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Annex A

Table 1a. Descriptive analysis by countries

```
. tabstat GDP FDI REMITANCE GROSS UNEMPLOYMENT HOUSEHOLD, statistics( mean sd ra
> nge skewness kurtosis ) by(Country) casewise save

Summary statistics: mean, sd, range, skewness, kurtosis
  by categories of: Country
```

Country	GDP	FDI	REMITA~E	GROSS	UNEMPL~T	HOUSEH~D
Denmark	.765241	.6896809	.3480996	2.355546	6.40278	1.441492
	2.028034	2.821681	.0645275	6.123759	.6553836	1.869474
	8.986028	9.855372	.1759468	26.63587	1.83	8.079246
	-1.882671	-.6516562	-.2698717	-.8219712	.922564	-.8080716
	6.986973	2.678601	1.509809	4.216605	2.212498	4.434001
Kosovo	3.354188	5.976445	16.70861	6.938411	37.79667	5.925648
	1.498703	3.171342	2.030601	9.363661	7.699556	4.172068
	5.101914	11.45786	5.483479	42.49651	20.47688	14.25293
	.8133761	.6282204	.4142336	.1212697	-.1906922	.2215408
	2.669043	2.576634	1.559092	4.287439	1.428679	2.068889
Switzerland	1.062473	4.9218	.3859873	2.535299	4.509298	1.60427
	1.627508	6.789215	.0320831	3.007678	.3105458	.5182064
	6.774314	26.42156	.0931392	12.12185	.8018003	1.876956
	-1.156853	-.2918396	.2608299	-2.296667	-.0453362	.4998379
	5.069441	2.765198	1.587131	8.100696	1.228916	2.590828
Total	1.727301	3.862642	5.814232	3.943085	16.23625	2.99047
	2.057824	5.073199	7.874408	6.877594	16.04212	3.338539
	11.84174	26.42156	19.78501	42.49651	43.3839	16.42104
	-.7455463	.0704824	.775708	.4411863	.9139606	1.441349
	5.782557	3.461669	1.700172	6.553237	2.087753	4.95672

Source: author's own elaboration.

Annex B
The Anova One Way is used to compare the three countries

Table 1b. Difference between the three countries regarding FDI

```
. oneway FDI COUNTRY, sidak

                        Analysis of Variance
    Source              SS         df       MS            F     Prob > F
------------------------------------------------------------------------
Between groups      234.864907      2    117.432454       5.49      0.0076
 Within groups      897.578251     42    21.3709107
------------------------------------------------------------------------
    Total           1132.44316     44    25.7373445

Bartlett's test for equal variances:  chi2(2) =  13.1954  Prob>chi2 = 0.001

  Comparison of Foreign direct investment, net inflows (% of GDP) by COUNTRY
                                (Sidak)
Row Mean-
Col Mean     Denmark      Kosovo
---------------------------------
   Kosovo    5.28676
               0.009

Switzerl     4.23212    -1.05465
               0.048       0.900
```

Source: author's own elaboration.

Table 1c. Difference between the three countries regarding remittances

```
. oneway REMITANCE COUNTRY, sidak

                        Analysis of Variance
    Source              SS         df      MS            F     Prob > F
------------------------------------------------------------------------
Between groups      2670.47802       2   1335.23901    970.25     0.0000
 Within groups      57.7994497      42   1.37617737
------------------------------------------------------------------------
    Total           2728.27747      44   62.0063061

Bartlett's test for equal variances:  chi2(2) = 161.4934  Prob>chi2 = 0.000

      Comparison of Personal remittances, received (% of GDP) by COUNTRY
                                (Sidak)
Row Mean-
Col Mean |     Denmark     Kosovo
---------+----------------------
  Kosovo |     16.3605
         |       0.000
         |
Switzerl |     .037888   -16.3226
         |       1.000      0.000
```

Source: author's own elaboration.

Table 8a. Granger causaliy test

```
. var GDP FDI REMITANCE GROSS, lags(1/2)

Vector autoregression

Sample:  2006 - 2018                            No. of obs      =        13
Log likelihood = -20.15079                      AIC             =  8.638583
FPE            =  .2387365                      HQIC            =  8.317012
Det(Sigma_ml)  =  .0002609                      SBIC            =  10.20306

Equation           Parms      RMSE     R-sq      chi2     P>chi2
------------------------------------------------------------------
GDP                    9     .885914   0.8689   86.13579   0.0000
FDI                    9     3.50208   0.5552   16.22367   0.0393
REMITANCE              9     .073802   0.9960   3231.122   0.0000
GROSS                  9     3.10191   0.7548   40.01281   0.0000
------------------------------------------------------------------
```

Source: author's own elaboration.

Związek przyczynowy między BIZ a przekazami pieniężnymi w Kosowie, Szwajcarii i Danii

Pogoń za pieniędzmi i kapitałem jest nieustannym dążeniem każdej gospodarki. BIZ są uważane za siłę napędową wzrostu gospodarczego, podczas gdy przekazy pieniężne są w coraz większym stopniu katalizatorem dobrobytu ludności. Celem opracowania jest analiza związku między przekazami pieniężnymi a napływem BIZ do Kosowa, Szwajcarii i Danii. Wtórne dane uzyskane z opracowania *World Development Indicators* zostały przeanalizowane za pomocą metody zwykłych najmniejszych kwadratów i testu przyczynowości Grangera oraz przetworzone techniką SPSS 21. Pomiar korelacji między zmiennymi: bezpośrednimi inwestycjami zagranicznymi, wzrostem PKB per capita, saldem migracji, przekazami pieniężnymi, nakładami brutto na środki trwałe, spożyciem gospodarstw domowych i liczbą ludności, daje wiarygodne wyniki. Wykorzystując przekazy pieniężne jako zmienną zależną, pierwsza hipoteza została częściowo potwierdzona. Najbardziej istotne statystycznie determinanty zwiększające przekazy pieniężne to populacja, bezrobocie i migracje. Wyniki regresji są niezadowalające w przypadku zmiennej zależnej BIZ (druga hipoteza). Determinanty są skorelowane pozytywnie, ale nieistotnie statystycznie, co potwierdza, że istnieją inne czynniki wpływające na wzrost napływu BIZ. Macierz korelacji wykazuje wysoką korelację między zmiennymi. Model przyczynowości Grangera, poprzez test Walda, reprezentuje przyczynę tego zjawiska. BIZ nie generują przekazów pieniężnych, ale przekazy pieniężne wpływają na wielkość BIZ. Ograniczeniem badania jest niejednorodność danych i krajów w próbie. Wyniki badania będą posłużyć instytucjom rządowym w Kosowie do poprawy otoczenia biznesowego, tak aby kraj stał się atrakcyjny dla inwestorów zagranicznych, dzięki którym nastąpi wzrost kapitału i zatrudnienia.

Słowa kluczowe: FDI, przekazy pieniężne, dane panelowe, OLS, przyczynowość Grangera

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Taxation of the Self-employed in Poland and other EU Countries – a Comparative Analysis

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Abstract

The article aims to compare the taxation of the self-employed in Poland and other EU countries. We show that, for years, Poland has been at the forefront of EU countries with the highest self-employment rates. Our analysis indicates that many people in Poland chose the status of self-employed, guided by tax optimization. Due to large differences in the burden of income tax and social security contributions of people working full-time and choosing self-employment, there are strong incentives to move from employment to fictitious self-employment. Our study shows that this significantly affects the revenues of the state budget and social security fund in Poland.

Keywords: self-employment, taxes, labor market, public finances

JEL: E62, H24, J30

Introduction

The share of self-employed people in total employment in Poland is growing rapidly. Poland is at the forefront of EU countries in this respect. The increase in the number of self-employed is often treated as a sign of entrepreneurship, which positively affects the economy. However, this phenomenon also has some weaknesses. The solutions adopted in the tax and contribution system may have a negative impact on the state of public finances, and in the longer term, also on the financial situation of self-employed workers. A self-employed person becomes a businessman, and therefore he has the option to choose the form of income taxation available for business. In Poland, the tax rate on business income is lower than the taxation on income from wage labor. This prompts some employees to move from a full-time job to fictitious self-employment.

The article aims to compare the taxation of the self-employed in Poland and other EU countries. We made a comparative analysis of the taxation of the self-employed and employees, and showed the consequences of self-employment for public finances in Poland. Additionally, Eurostat data were used to show significant differences in the taxation on self-employment in Poland and other EU countries.

Self-employment. Problems with definition and measurement

There is no definition of self-employment in any Polish legal act. International publications also indicate the ambiguity of this concept. Małgorzata Skrzek-Lubasińska (2017, p. 15), when reviewing the terminology related to self-employed workers used in scientific publications and public debate, lists nine Polish synonyms of this concept. There are also 12 synonyms in English: freelancer, small business owner, micro-business owner, home-based business, contractor or sub-contractor, independent contractor, consultant, free agent, solo-proprietor, solo-entrepreneur, and solopreneur.

Difficulties with the definition of self-employment result mainly from the fact that this category comprises very diverse people from various socio-professional groups, practicing various professions, with different levels of education, and who also receive very diverse income from their businesses. Freelancers (e.g., doctors, lawyers, journalists, and artists), as well as farmers, construction workers, security guards, and cleaners, are self-employed. It should also be considered that some self-employed people are naturally in this group due to their business (e.g., individual farmers), while others chose this form of business mainly to reduce tax burdens (income tax and social security contributions) or were "pushed" into it by employers seeking to reduce labor costs.

Difficulties in defining such a diverse category as self-employment translate into difficulties in measuring it statistically. According to the widest definition used in the In-

ternational Labor Organization (ILO), the World Bank, and the Organisation for Economic Co-operation and Development (OECD), including individual farmers, there were nearly 33 million self-employed in the European Union countries in 2019. They were most frequently represented by freelancers (22.4%), employees providing services and sales representatives (15.6%), as well as craftsmen and retailers (15.3%). Next were farmers (13.8%), technical specialists, such as IT specialists, architects, and designers (12.0%), and entrepreneurs/managers (11.9%). The share of operators (4.0%), people performing simple work (3.0%), and those offering pastoral (spiritual guidance) support (1.8%) was small. Compared to the self-employed structure observed in 2016, only the increase in the share of freelance professions is evident – at 20.9% at the time (Eurostat data).

The self-employment rate (the percentage of self-employed people in the total number of employees in the economy) varies considerably (Table 1). In 2019, it ranged from 8.0% (Denmark) to 33.4% (Greece). The self-employment rate has remained high for years in Greece and Italy (Żukowska 2017, p. 60), which is largely due to the nature of the economy of these countries (a large share of employment in tourism, gastronomy, the hospitality industry, small trade and crafts, as well as agriculture). The emergence of Romania in this group can be explained by changes in the labor market related to political transformation and a large share of the employed in agriculture. It turns out that Poland (with a 20.1% share) is at the forefront of countries with the highest self-employment rates. With the EU average of 15.2%, self-employment did not exceed 10% of the total employment in four countries (Germany, Sweden, Luxembourg, and Denmark).

Table 1. Self-employment in the EU (as % of total employment in 2019)

Countries	% of self-employed	Countries	% of self-employed
Austria	11.9	Italy	22.9
Belgium	14.0	Latvia	11.4
Bulgaria	11.8	Lithuania	11.5
Croatia	12.0	Luxembourg	8.5
Cyprus	13.2	Malta	14.0
Czech Republic	16.8	Netherlands	16.6
Denmark	8.0	Poland	20.1
Estonia	10.6	Portugal	16.7
Finland	13.2	Romania	24.8
France	11.6	Slovakia	14.7
Germany	9.8	Slovenia	15.0
Greece	33.4	Spain	15.9
Hungary	10.3	Sweden	9.6
Ireland	14.9	United Kingdom	15.1

Source: data.world.bank.org (accessed: 21.04.2020).

It is also worth noting (as the data from Table 2 clearly show) that the share of self-employed people in total employment is closely related to the level of economic development of the country. In high-income countries, the self-employed usually account for a dozen or so percent of the total employed, while in underdeveloped countries, where the average income is low, the self-employed constitute even more than 80% of the total employed. The poor development of industry and services in these countries means that self-employment becomes a chance to earn a living. Thus, when a country reached a higher level of economic development, the share of self-employed people decreased. It is worth noting, however, that at the turn of the 20th century, many factors appeared in economically developed countries (such as the development of new technologies and changes in the organization of work) that were conducive to the growth of self-employment (Wennekers et al. 2010).

Table 2. Self-employment in selected groups of countries in 2019 (as % of total employment)

Groups of countries	% of self-employed	Countries	% of self-employed
EU	15.2	Chad	93.3
Eurozone	14.7	Afghanistan	82.3
OECD	15.0	DR Congo	77.1
Countries by income: – high – middle – low	 12.3 51.0 82.5	Cameroon	76.7
		Sub-Saharan Africa	76.0
		Angola	70.3
		Azerbaijan	68.0

Source: data.world.bank.org (accessed: 21.04.2020).

In turn, Eurostat BAEL-LFS data on natural persons conducting economic activity, but excluding the self-employed in agriculture, show that in the EU–28 countries, there were 23.4 million self-employed (2018), and their share in total employment in individual countries is shown in Table 3. This share ranges from 23.3% (Greece) and 20.2% (Italy) to 7.9% (Sweden), 7.3% (Romania) and 6.8% (Denmark). It is also evident that the percentage of employers and self-employed workers is generally higher in the new EU member states. In Poland, this percentage (12.1%) is close to the EU–28 average of 11.4%.

Table 3. Employers and self-employed in the EU (as % of total employment excluding agriculture) in 2017

Countries	% of self-employed	Countries	% of self-employed
Austria	8.8	Italy	20.2
Belgium	12.5	Lithuania	8.5
Bulgaria	8.9	Luxembourg	8.2
Croatia	7.8	Latvia	10.0
Cyprus	10.8	Malta	13.7
Czech Republic	15.8	Netherlands	14.8

Countries	% of self-employed	Countries	% of self-employed
Denmark	6.8	Poland	12.1
Estonia	9.5	Portugal	11.8
Finland	10.0	Romania	7.3
France	9.7	Slovakia	14.8
Greece	23.3	Slovenia	10.1
Germany	8.7	Spain	14.8
Hungary	8.7	Sweden	7.9
Ireland	11.1	United Kingdom	13.7

Source: Eurostat, as cited in Cieślik 2019, p. 14.

The Central Statistical Office (CSO) data (2006, 2009, 2017) show that the number of self-employed people is growing rapidly in Poland. According to the CSO definition, self-employed workers are natural persons who conduct non-agricultural economic activity and who do not employ employees based on an employment relationship. In 2006, there were 835,000 people with a status of self-employed, in 2009 the number exceeded one million (1,014,000), and in the following years, the estimated number of self-employed persons increased rapidly. At the end of 2017, the CSO registered 1.2 million self-employed, and at the end of 2018, 1.3 million. Thus, compared to the previous year, the number of self-employed had increased by 8.3%, while since 2006, the number had increased by over 30%.

Advantages and weaknesses of self-employment

In the Polish economic and management literature (Puzio-Wacławik 2013; Szepelska 2013; Wiśniewski 2013; Jasińska-Biliczak 2015; Skrzek-Lubasińska, Sobiecki 2017), self-employment is treated as an important form of supporting entrepreneurship development in Poland. Self-employment is usually identified with entrepreneurship and innovation. The belief is often expressed that the most entrepreneurial and innovative self-employed will increase the scale of their activities, invest, introduce technical and organizational improvements, and create new jobs. Self-employment is also an affirmation of the financial independence of their abilities and skills, proof of trust in themselves and others, striving for independence and self-development, and deciding on the purpose of the activity, place, and time of work (Domański 2005).

Therefore, the growing number of self-employed in Poland is often assessed positively. It is pointed out that this leads to a more flexible labor market, lowering labor costs and reducing the so-called tax wedge (i.e., the difference between costs related to employee employment and net salary), which encourages employment growth and reduces the unemployment rate.

Cieślik (2019) clearly opposes this approach in an attempt to oppose common truths about entrepreneurship and self-employment deeply rooted in public awareness. He verifies the three widely disseminated views on this subject:

1. The more entrepreneurs (people engaged in economic activities), the better for the economy and society. Justifying this hypothesis, the author indicates that the share of self-employed people depends on the level of economic development and cultural factors. Given the technical and organizational quality and the scale of operations of the Polish business sector, a further increase in the number of people running a business is not justified.
2. Newly created enterprises are established with a view to developing and employing employees in the future. In Cieślik's (2019) opinion, less than 10% of those setting up a business every year are likely to become employers in the future. This is indicated not only by observations regarding Poland, but also by trends occurring in other countries.
3. Incentives to start new businesses lead to economic recovery and GDP growth. It turns out, however, that concessions and preferences for self-employed and micro-entities do not bring the expected results due to the unstable form of this activity conducted on a small scale, with low technical equipment, low productivity, and limited development ambitions of the owners.

The arguments presented above indicate that supporting self-employed and micro-entities in Poland is based more on ideological and doctrinal considerations than on substantive analysis of reality. In practice, entrepreneurs are the largest beneficiaries of the transition of employees employed under an employment contract to self-employment. By using the services of such an employee, they can significantly reduce their labor costs, as they are not burdened with social security contributions and obligations to the employee under the Labor Code (notice period, vacation and health leave, and ensuring working conditions in accordance with health and safety at work requirements). At the same time, the employee receives a higher salary, which in the short run can be positively assessed from a motivational point of view.

It should also be remembered that the decision on self-employment has some negative consequences, which include:

- Loss of entitlements and privileges guaranteed by the Labor Code, such as vacation, health, maternity, and sick leave, social benefits, and work security;
- Business risk and prospects not only for a higher, but also for a lower income, incurring losses and a threat of bankruptcy;
- Running a business necessitates incurring costs that reduce income;
- Lower social security contributions paid by self-employed people mean lower pensions in the future.

Analysis of the impact of self-employment on public finances, i.e., the revenues of the state budget is missing in the relevant literature. And here emerge two sensitive issues.

First of all, self-employed workers are a very diverse group from the point of view of tax law. They can pay income tax in the form of a tax chart, registered lump sum, according to general principles (progressive tax with rates of 18 and 32%, currently 17 and 32%), or choose a flat tax (19%). The lack of an unambiguous definition of self-em-

ployment, combined with a great choice of forms of taxation, can lead to tax optimization beneficial for the taxpayer, but not necessarily in line with legal requirements, budget needs, as well as social justice requirements. This happens when people who perform the same professional duties pay different taxes just because they choose a specific formal professional status.

Secondly, the self-employed pay lower social contributions than employees employed under an employment contract. This reduces the income of the Social Security Fund on an ongoing basis and means that with the current structure of employed, self-employed, and pensioners, it is necessary to finance the Social Security Fund from the state budget. Much more serious, however, are the long-term effects of low self-employment contributions. In the future, self-employed workers will be threatened by low pensions and even the danger that the state will be forced to "contribute" to their minimum pensions. The deepening Social Security Fund deficit will also lead to shifting the tax burden onto future generations, i.e., onto employees who are not free to choose the tax rate and lower security contributions.

Taxation of self-employed people in Poland

Even before the beginning of the transformation process in Poland, the small private sector played a large role, much greater than in other countries of Central and Eastern Europe. The expansion of micro-enterprises dates back to 1990. The transition to a market economy enabled the liberation of entrepreneurship on a massive scale, and the Act on Freedom of Economic Activity (colloquially referred to as the Wilczek Act) gave great freedom to conduct business activity in accordance with the principle that "everything that is not prohibited is allowed." It should also be noted that the rapid pace of privatization and elimination of state-owned enterprises led to a sharp decline in employment. It was not only workers but also engineers and economists who were losing their jobs. Starting their own business, especially by entrepreneurial people, became an opportunity not only to survive a difficult period but also to start their own business and make a career in business.

In subsequent years, entrepreneurship in Poland developed quickly, taking various forms: self-employment, i.e., people without employees, micro-entities (enterprises employing up to 9 employees, including the owner of the company), as well as small and medium-sized enterprises.

From the beginning of the transformation to the present, successive governments have created tax preferences for entrepreneurs. The fact that entities conducting business activity are not excessively burdened with taxes is proved by the analysis conducted by the Ministry of Finance (Table 4).

Table 4. Estimated amount of business taxation (2016)

Type of taxation	Number of taxpayers	Taxes (PLN)		
		Mean	Median	Amount
Total	2,232,830	12,960	1,617	25.6 billion
Lump sum	474,448	3,033	420	1.4 billion
Tax rates	1,240,051	3,375	920	3.5 billion
Flat tax	518,331	43,794	19,298	20.7 billion

Source: Chrostek et al. 2019, p. 42.

The data show that in 2016, the tax burden – both for entrepreneurs paying lump-sum tax and those paying tax according to tax rates – was very low; on average, it amounted to slightly over PLN 3,000 per year[1]. It is also worth paying attention to the median tax burden, which amounted to PLN 420 for the lump-sum taxpayers and PLN 920 for taxpayers who choose general principles (tax rates). This means that almost half of these businessmen paid minute income taxes, and a significant part of them did not show their income. Almost 78% of people running a business fit into these two groups (lump sum tax rate and general principles).

The remaining 22% of businessmen chose a flat tax, i.e., they pay their taxes at a rate of 19%. It is also worth noting that they are businessmen with high average incomes (PLN 43,794). The large diversity of income of this group of businessmen is demonstrated by the median, which is more than half lower than the mean income (PLN 19,298). This group of businessmen probably also includes many self-employed workers.

It is lower taxation of business income than taxation of income from work that encourages many high-income people to optimize taxation by switching to fictitious self-employment. The calculations of Cieślik (2018) regarding an employee earning PLN 15,000 per month indicate that by moving to self-employment, an employee may have a net income higher by even PLN 50,000 per year. It should be added that this is not the only financial effect of the transition from full-time employment to self-employment. A self-employed person, by obtaining the status of entrepreneur, can deduct tax-deductible costs, such as the costs of buying and running a car, computer, and telephone, among others, seriously reducing taxable income.

It is worth referring to the analysis conducted at the Ministry of Finance. Chrostek et al. (2019) show that taxes on business activities are degressive, while taxes on employees employed under employment contracts are essentially flat. The tax rate on employment contracts (personal income tax + contributions in relation to taxable income plus social security contributions of the employee and employer) is approximately 37%, and it is similar in different income brackets. Effective taxation of individual business activity is regressive – it decreases with an increase in annual income, from 53% (with an annual gross income of PLN 10–25,000) to 24% (with an annual income

1 Low tax burden for entrepreneurs who file their tax returns according to general principles shows that taxpayers make maximum use of the allowances due to them, the option to file a joint tax return with their spouses, and of the relief for children.

of PLN 100–200,000). The high burden on low-income entrepreneurs is the result of the lump sum social security contributions (PLN 1,121.52 per month in 2016).

How can such unequal taxation of labor and business be explained on the basis of economic theory and practice of the transformation period?

For over 200 years, two alternative theories that justify the collection of taxes have been considered in the public finance literature, the benefit/equivalence principle and the ability-to-pay principle.

The benefit/equivalence principle assumes that taxpayers should contribute to financing the state's activities to the extent to which they use them. This rule originates from a time when the state was seen mainly as a "night watchman," and it was assumed that the less the state interfered in the economy, the better. Therefore, taxes should be low and harm entrepreneurs as little as possible. On the other hand, the principle of tax ability/tax efficiency assumes that taxes should be collected from those who are able to cope with such burdens ("equality of an offering", tax progression, tax reliefs, and exemptions). The adoption of this principle as the basis for collecting taxes is most often justified by the requirements of justice, fiscal efficiency, and the need to use taxes to achieve various social purposes.

To put these principles concisely, it can be said that the proverb "Do unto others as you would have them do unto you" reflects the essence of the principle of equivalence. It should be added that this concerned the period when the State did not give much, but also people did not count on much from the state. For this reason, some modern economists believe that this principle should be rejected (Kosek-Wojnar 2012, p. 58). Adopting the ability-to-pay as a tax base, on the other hand, means accepting the Robin Hood principle, since those who are better off are more able to pay taxes, and at the same time, the state has to help them less, so it can spend the funds obtained from taxes on other purposes.

Many arguments indicate that from the beginning of the Polish transformation, the principle of equivalence/benefits played a dominant role in shaping tax rules and the state's attitude towards micro and small enterprises.

This was influenced by many circumstances:

1. The transition to a market economy was based on the liberation of entrepreneurship on a massive scale, and the Act on the freedom of economic activity provided great opportunities because "everything that is not prohibited is allowed."
2. The privatization of state-owned enterprises led to a large decrease in employment. For many people, starting a business on their own was a great opportunity.
3. In Poland, capitalism began to be built without family capitalists. Therefore, it was necessary to create favorable conditions to build domestic capital and Poland's own middle class through various forms of privatization and tolerating the development of the shadow economy.
4. Changes in the tax system were geared towards favoring private business activities and limiting the redistributive role of the state.

Preferential taxation for small enterprises involves:

1. Creating the possibility to choose the most favorable form of business taxation – in addition to taxation according to general principles arising from the Personal Income Tax Act (tax progression – in the beginning, three rates, then two: 18 and 32%), small businesses can benefit from preferential, simplified, and less fiscal forms of taxation in the form of a tax chart and a lump sum, and since 2004 they can also choose the flat-rate tax (19%);
2. Low taxation of natural persons conducting economic activity (lower than for persons that earn a living from wage labor). Theoretically, this can be explained using the following arguments:
   – A businessman's work is difficult, exhausting, with nonstandard working hours, and it is stressful, so it requires adequate remuneration;
   – Running a business is associated with high risk; it may result in failure, and the business may have to be closed, which should also be considered;
   – In the business process, the businessman involves not only his own work, inventiveness, and organizational skills, but also capital that, if used in another undertaking, would bring specific income (opportunity cost of capital);
   – The lower the taxation of business activity, the higher the income the businessman has and can allocate to the development of the company, creating new jobs and introducing innovative solutions, which brings macroeconomic effects.

The liberal economic policy implemented in Poland favored businessmen not only by creating tax preferences for them, but also by creating other systemic solutions that support businesses, such as making the labor market more flexible, low and short-term unemployment benefits, low minimum wage, limiting the scope of social benefits, tolerating an extensive gray area that enabled some employers to avoid tax burdens, and tolerating a large proportion of employees employed on fixed-term contracts and mandate contracts.

However, is this approach to small business still valid after more than 30 years of building a market economy in Poland? Is it any wonder that the Ministry of Finance in 2019 attempted to limit fictitious self-employment by proposing to conduct an entrepreneur test? The Ministry assumed that an entrepreneur who is banned from acting for the competition and who works only for one contractor is not an entrepreneur, but only a self-employed person who performs the duties of a full-time employee, and their business is only a method of tax optimization. Vice Minister of Finance Filip Świtała, a participant in the tax workshops of Lazarski University and CASE (www.lazarski.pl (accessed: 10.09.2019)), assessed that this situation could affect 166,000 persons.

For many years, high-income employees switching to fictitious self-employment could, sometimes even significantly, reduce the tax and contribution burden and achieve an increase in income. For educated people with a good professional position, and who were sought after on the market, self-employment did not pose a real threat. And the choice of the status of self-employed was also beneficial for the company, as it made it possible to reduce labor costs.

On the other hand, in the case of employees with low qualifications and a weak professional position, the transition to self-employment, although also beneficial for the employer, is not always as attractive to employees. More often, employees are "pushed" out of full-time employment to self-employment, and their weak and uncertain situation forced them to accept such an offer.

The taxation of self-employment in Poland compared to other EU countries

To show the specifics of taxing self-employed people in Poland, it is worth referring to the experience of other European Union (EU) countries. In accordance with the definition adopted in the European Commission, the income of people conducting independent economic activity (defined as self-employed) is treated as capital income. It is assumed that natural persons conducting small-scale business operations have the capital necessary to conduct a business activity, take risks, may employ wage earners, and pay contributions for themselves and their employees. At the same time, however, entrepreneurs must allocate part of their revenues to the development and modernization of the company. For this reason, small and medium-sized enterprises are taxed on preferential terms, and their taxes are treated as capital taxation in Eurostat statistics.

Taxes imposed on self-employed workers in the EU–28 constitute approximately 5% of budget revenues from taxes. However, their share in EU countries is very diverse (Table 5). In some countries, it does not even reach 1%, e.g., 0.3% in Slovakia, 0.4% in Estonia, 0.7% in Latvia and 0.8% in Croatia. In this ranking, Poland came first with an 11.6% share of this tax in budget revenues, and during some periods, it exceeded 12%. A relatively high share (above average), but much lower than in Poland, was also recorded in Italy (7.7%), Austria (6.5%), the Netherlands (5.7%), and Germany (5.5%).

Table 5. Share of taxes imposed on self-employed workers in budget revenues from taxes (in %)

Countries	1995	2007	2017	Ranking 2017	Difference	
					1995–2017	2007–2017
Austria	5.8	5.9	6.5	4	0.7	0.6
Belgium	5.7	4.8	5.4	5	–0.3	0.6
Bulgaria	2.7	2.6	2.5	17	–0.2	0.0
Croatia	–	1.3	1.6	22	–	0.3
Cyprus	2.0	1.3	1.6	23	–0.4	0.3
Czech Republic	4.1	3.7	2.9	14	–1.2	–0.8
Denmark	2.5	2.2	2.0	19	–0.5	–0.2
Estonia	0.5	0.7	0.4	27	–0.1	–0.3
Finland	6.0	4.4	4.1	10	–1.9	–0.2

Table 5. (continued)

Countries	1995	2007	2017	Ranking 2017	Difference	
					1995–2017	2007–2017
France	4.1	4.9	4.0	11	–0.1	–0.9
Germany	5.1	5.5	5.4	6	0.3	–0.1
Greece	–	2.7	2.1	18	–	–0.5
Hungary	1.8	1.5	1.7	20	–0.1	0.2
Ireland	4.0	3.6	3.5	12	–0.5	–0.2
Italy	7.3	8.3	7.8	2	–0.5	–0.5
Latvia	0.1	0.7	0.7	26	0.6	0.0
Lithuania	1.8	3.3	5.2	7	3.4	1.8
Luxembourg	4.7	3.3	4.3	9	–0.4	1.0
Malta	4.0	3.4	2.7	16	–1.3	–0.6
Netherlands	6.3	6.2	7.0	3	–0.7	0.9
Poland	7.1	12.8	11.4	1	4.3	–1.4
Portugal	3.1	1.5	1.7	21	–1.4	0.2
Romania	1.1	1.6	1.1	24	0.0	–0.5
Slovakia	–	1.1	0.3	28	–	–0.9
Slovenia	2.2	2.8	2.8	15	0.6	0.0
Spain	7.0	4.8	4.9	8	–2.1	0.1
Sweden	1.3	1.5	1.1	25	–0.2	–0.4
United Kingdom	4.2	13	3.2	13	–1.0	–0.9
EU–28	-	5.2	4.9	x	–	–0.3

Source: 1995 – European Commission 2011, p. 343; 2004–2016 – European Commission 2018, p. 229; 2019, p. 22.

The previously presented statistical data on the scale of self-employment show that self-employed in Poland constitute approximately 20% of all employees. The share of taxes (income and health insurance contributions) in budget revenues from taxes is the highest in Poland (11–12%).

At the same time, however, in countries with the highest self-employment rates recorded for years, i.e., in Greece and Italy, they contribute to the state budget to a much smaller extent – approximately 2% and 7–8%, respectively. This means that people with very high incomes constituted a large proportion of the self-employed in Poland, for whom the transition to the status of self-employment made it possible to significantly reduce their tax burden. It can be assumed that this group includes those who chose to switch to self-employment mainly considering the reduction of the tax burden. This could apply to people who work on managerial contracts, highly qualified specialists, and members of free professions, who set up sole proprietorships and became entrepreneurs to reduce the tax burden.

The data in Table 6 show even more clearly the differences in the burden of income tax on natural persons. The tax burden on individuals was divided into four groups. Taxes imposed on: 1) employment, 2) self-employment (running businesses on their own), 3) transfers (old-age pensions, disability pensions, other social benefits), 4) capital

income of natural persons. It turns out that in 2016, the share of employment-related tax revenues in Poland was the lowest. It constituted only 47.9% of income from PIT (compared to over 90% in Estonia, Slovakia, and the Czech Republic), and the share of taxes paid by self-employed people was the highest, constituting 29.4% of total income from PIT. The share of tax revenues from self-employment in Germany (20.6%), Austria (18.5%), and the Netherlands (17.9%) was also relatively high. The lowest was in Estonia, where it was only 0.7%, while in several countries (Czech Republic, Sweden, Latvia, Slovenia, Slovakia, and Denmark), the taxes of self-employed people did not exceed 5% of the tax burden on natural persons. The European Commission data show that in Poland, this situation has persisted for a long time. In 2004, taxes paid by self-employed people constituted 24.6% of income from PIT, while in 2007, it was even 30.4% (European Commission 2018, p. 293).

Table 6. Structure of budget revenues from personal income taxes in 2016 (in %)

Countries	Structure of budget revenues from PIT on account of			
	Employment	Self-employment	Transfers	Capital
Austria	59.5	18.5	19.3	2.7
Belgium	74.8	13.6	15.6	– 4.0
Bulgaria	88.5	8.6	0.0	3.0
Croatia	75.0	5.1	2.4	17.5
Cyprus	91.5	5.1	2.5	0.9
Czech Republic	95.5	2.2	0.0	2.3
Denmark	68.1	4.9	25.0	2.1
Estonia	90.9	0.7	6.0	2.4
Finland	61.8	7.2	23.6	7.4
France	55.5	9.5	18.5	16.2
Germany	72.2	20.6	4.4	2.8
Greece	50.2	15.0	23.1	11.7
Hungary	83.8	5.3	0.9	10.0
Ireland	80.9	8.5	2.0	8.6
Italy	53.9	14.5	28.0	3.6
Latvia	83.3	3.4	10.7	8.6
Lithuania	88.2	0.2	6.0	5.6
Luxembourg	74.2	10.5	4.7	4.5
Malta	73.1	7.0	17.9	1.9
Netherlands	66.8	17.9	20.2	4.9
Poland	47.9	29.4	17.6	5.1
Portugal	57.3	5.6	24.8	12.3
Romania	58.7	2.9	5.3	33.1
Slovakia	94.9	4.0	0.0	1.1
Slovenia	87.3	4.0	1.5	7.2
Spain	67.1	8.9	12.5	11.5
Sweden	68.6	2.3	19.7	9.4

Table 6. (continued)

Countries	Structure of budget revenues from PIT on account of			
	Employment	Self-employment	Transfers	Capital
United Kingdom	74.5	10.1	2.7	12.7
EU–28	73.0	8.7	11.1	7.2

Source: European Commission 2018, pp. 292–295.

The increase in the number of self-employed people in EU countries means that this model is becoming increasingly attractive for many professions. Unlike traditional professions such as doctors, dentists, or lawyers, you do not need to have any license to enter the self-employed group. Therefore, many new professions appeared in this group, related to IT and the so-called "creative" professions (computer graphic designers, designers, project managers, and specialists in marketing, finance, and management). In this context, self-employment is often promoted as a way to boost entrepreneurship and innovation, and to create new jobs. Self-employment also leads to greater autonomy, contentment, and independence in managing one's professional life. At the same time, however, more and more employers are "pushing" some employees into self-employment to save on social contributions and social benefits related to the employment relationship. And this means that the self-employed are most strongly represented in the lowest and highest income brackets.

When analyzing the data from Table 6, it is also worth noting that in Poland, a relatively large share of budget revenues from income taxes comes from transfers (17.6% against 11.1% in EU–28). In some European Union countries (Bulgaria, the Czech Republic, and Slovakia), transfers are not taxed, while in six countries, they account for no more than 2% of budget revenues from PIT – from 0.9% (Hungary) to 2.7% (United Kingdom).

In Poland, the government has been introducing many facilitating conditions for small entrepreneurs for several years. It began in 2017 with a reduction in the corporate income tax rate to 15%, and even to 9% in 2019 (for entrepreneurs with revenues of EUR 1.2 million; in 2020, this limit was raised to EUR 2 million). New reliefs came into effect from 2018 after the President of the Republic of Poland signed a package of laws referred to as the Constitution for Business (Act of 6 March 2018 – Entrepreneurs' Law, Journal of Laws 2018, item 646). The most important for the self-employed are exemption from social security contributions for the first six months and reduced contributions for the next two years.

People who started their business in 2020 can benefit from a special preferential social security contribution. For the first 24 months, it is calculated as 30% of the minimum wage (which has been net PLN 2,600 since 2020). The contribution calculated in this way, without the voluntary sickness contribution, is PLN 590.03, and 609.14 PLN with the voluntary sickness contribution. The solutions introduced by the government under the Constitution for Business and later were intended to increase the motivation to start one's own business instead of seeking or continuing a full-time job.

Earlier, tax and contribution solutions encouraged the transition to self-employment mainly of high-income employees; the low-paid were "pushed" by entrepreneurs,

who thus reduced labor costs. Recent solutions create an incentive to set up their own business also for this group of employees. However, they are more exposed to risk and loss of income than highly qualified professionals, and in addition, low social security contributions mean a very low pension in the future.

The government explains such tax and contribution preferences for small businesses and self-employed people by the need to support entrepreneurship, which is the basis for the increase in the competitiveness of the Polish economy. Apart from the obvious political values indicating that the government is reducing the tax burden on entrepreneurs, such economic policy raises serious reservations. First of all – was it justified to encourage people to run their own business in 2019 and even at the beginning of 2020? There were employee shortages in the labor market, wages were rising, people could find employment in large companies, where labor productivity is higher, and the opportunity for promotion and higher wages are also better than in a small company or on precarious self-employment. The second remark concerns the effects of increased self-employment on the state budget and the social security fund. The increase in self-employment, motivated mainly by the desire to optimize tax burdens, means that budget revenues from personal income tax fall, and, to a much greater extent, they reduce the revenues of the social security fund, meaning a very low level of future pensions for the currently self-employed.

Conclusion

Changes in the labor market have led to the increased popularity of self-employment. Poland has been at the forefront of EU countries with the highest self-employment rates for years. Many factors point to the fact that in Poland, among the self-employed, there are many people that are in fact "fictitiously self-employed" and should be classified as employees.

Our analysis shows that many people in Poland chose the status of self-employed guided by tax optimization.

Due to large differences in the burden of income tax and social security contributions of people working full-time and choosing self-employment, there are strong incentives to move from employment to fictitious self-employment in Poland. Our study shows that this significantly affects the revenues of the state budget and social security fund.

Before the Great Recession, in the literature and in the media, the advantages of self-employment were exposed, i.e., freedom of action, greater prospects, higher income, and the possibility of choosing the optimal form of taxation and contributions. Less importance was attached to the risk associated with the transition to self-employment or the consequences of losing benefits under the Labor Code, such as holiday and sick leave. However, for the last decade, the European Economic and Social Committee has drawn attention to these problems, e.g., issuing *Abuse of the status of self-employed*

(European Economic and Social Committee 2014). It contains, among others, proposals regarding the development of an unambiguous definition of self-employment applicable throughout the EU, which includes self-employed workers in occupational health, safety regulations, which ensure access to vocational training institutions, and the creation of service centers that care about their level of safety.

However, in Poland, in contrast to most EU countries, the consequences of the Great Recession were very mild. It was the coronavirus pandemic that made people aware of the role of labor security, which in the case of the self-employed is much lower than in the case of employees.

Thus, in our opinion, after the coronavirus pandemic, the role of labor security will increase relative to the differences between the net income of the self-employed and employees. It presumably will decrease incentives for fictitious self-employment. Nevertheless, there is still a need to reform the taxation of employees and self-employment in Poland, which would decrease incentives for fictitious self-employment and increase budget revenues.

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Opodatkowanie samozatrudnionych w Polsce i w pozostałych krajach UE – analiza porównawcza

Celem artykułu jest porównanie opodatkowania osób samozatrudnionych w Polsce z rozwiązaniami stosowanymi w innych krajach Unii Europejskiej. W artykule wykazane zostało, że polski rynek pracy cechuje się bardzo wysokim udziałem osób samozatrudnionych. Przeprowadzona analiza wskazuje, że istotną przyczyną tego popularności samozatrudnienia w Polsce jest optymalizacja podatkowa. Ze względu na duże różnice pomiędzy obciążeniami podatkowymi osób pracujących na etat i osób samozatrudnionych występują silne bodźce do prowadzenia fikcyjnego samozatrudnienia. W artykule ukazane jest, że zjawisko to silnie wpływa zarówno na dochody budżetu państwa jak i dochody Funduszu Ubezpieczeń Społecznych.

Słowa kluczowe: samozatrudnienie, podatki, rynek pracy, finanse publiczne

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A Comparative Analysis of the Expectations Hypothesis of the Term Structure of Interest Rates between the BRICS and G7 Countries

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Abstract

This paper examines the predictive ability of the expectations hypothesis of the term structure of interest rates in the BRICS and G7 countries by relating each country's monthly 3-month Treasury bill rate to 10-year government bond rates, from May 2003 to May 2018. The panel ARDL model, applying the mean group (MG), pooled mean group (PMG), and dynamic fixed effects (DFE) estimators, is employed to compare the short- and long-run relationships in both groups of countries. The results show that the expectations hypothesis holds in both BRICS and G7 country groups. In the long run, the short-term interest rate is able to predict the long-term interest rate in both the BRICS and G7 countries. Interest rates in BRICS indicate rapid adjustment back to the long-run equilibrium, while the adjustment is sluggish in the G7 block. Based on the findings of the study, the sluggish adjustment to the equilibrium in the G7 gives the impression that the financial crisis had an impact on the term structure of interest rates as the G7 countries were directly affected by the crisis.

Keywords: Expectations hypothesis, panel ARDL, G7, BRICS, term structure

JEL: E43, D92, G12

Introduction

When a scholarly theory is flawed, it has the tendency to set the whole economy in the wrong direction (Nocera 2009). Thus, the validity of a financial or an economic theory is of vital importance since major stakeholders, especially governments and investors, rely on it (Obalade and Muzindutsi 2018). However, since the inception of the Expectation Hypothesis of interest rate structure (EH), there have been opposing views regarding its validity; thus, the theory has been at the centre of debate among academics and economists. The theory proposes that an investment that consists of a series of short-term securities should have the same returns as an investment on a longer-term security for the next holding period (Hardouvelis 1994). As such, a valid EH makes it possible to analyse the content on the term structure of interest rates, which may be useful for decisions related to investments and management of risk, or the analysis of future macroeconomic conditions such as the probability of a downswing in an economy (Musti and D'Ecclesia 2008). Understanding interest rate dynamics through EH is also essential for derivative security pricing since it depends on market rates and hedging for investment strategies (Modena 2008). It also helps in forecasting, as Mankiw and Miron (1986) affirm that the short rate is the opportunity cost of holding money; on the other hand, aggregate-spending decisions are contingent upon the long rate. Moreover, Velásquez-Giraldo and Restrepo-Tobón (2016) argued that a good forecast is essential for security pricing, financial planning, and risk management. Nonetheless, empirical evidence on EH varies as studies provide mixed results.

Despite there being no overall consensus regarding the validity of the EH, it is necessary to test the theory in modern-day economies where the approach of monetary policy seems to vary. In the spirit of Verheyden, De Moor, and Van den Bossche (2013, p. 3), "one needs to stay critical even with respect to well-established theories, as the world is not a static environment." Therefore, this study uses different states of the world to assess the predictability of the term structure of countries that fall within two economic categories: developed and emerging economies. In particular, the Group of Seven (G7) countries represent developed nations, while emerging economies are represented by Brazil, Russia, India, China and South Africa (BRICS). The G7 bloc consists of the world's leading and most advanced economies: Canada, France, Germany, Italy, Japan, the United States, and the United Kingdom. The BRICS group consists of five of the world's major emerging market economies, which account for about two-thirds of emerging market GDP (Global Macroeconomics Team 2016).

In testing the validity of the EH, changes in the monetary policy framework of the countries under observation, and changes in financial markets should be considered (Beechey, Hjalmarsson, and Österholm 2009). The EH has significant implications for financial development, particularly, for the newly formed BRICS bank – the New Development Bank (NDB). Features found on the term structure of interest rates provide valuable information in the future prediction of expected economic cycles within fi-

nancial markets (Rossouw, Vermeulen and Leshoro 2014). These features may assist the NDB in attracting financial investments, and in reducing any arbitrage opportunities that may arise as a result of possible gaps found among the country rates. In addition, the information embedded in the term structure also becomes significant for various reasons (Panigrahi 1997). These reasons include the use of the information contained in the term structure by central banks as a guide to monetary policy, as outlined by Mishkin (1991) and Gurkaynak and Wright (2012).

Any comparison of these different group of nations is material, since it may reveal the effect of the global financial crisis on the term structure of interest rates between the two settings. For instance, the G7 countries were severely hit by the 2007/2008 financial crisis, and their interest rates have been significantly low (Danthine 2012). On the other hand, interest rates in the BRICS countries have been relatively high; thus, they have become an attractive alternative for investors despite their higher level of risk compared to developed nations (Magud and Sosa 2015).

Consequently, there has been a shift in monetary policy in most of the G7 countries, and the effects of the financial crisis further spread to emerging economies' term structures. For that reason, it becomes interesting to assess the validity of the EH in both settings in light of the recent financial crisis. Furthermore, in light of the low interest rates in some G7 countries currently, the study of EH may contribute towards monetary policy authorities' desire to stimulate economic activity in the affected economies by influencing the expectations of future monetary policy, as suggested by the EH (Gurkaynak and Wright 2012). In addition, the study of EH and any comparison provides market participants with the ability to predict future changes in interest rates (Modena 2008), as EH assists in the analysis of complex interest rates dynamics, thereby allowing for a better investment or risk management decision process. For instance, interest rate forecasts enable them to hedge against risks that are linked to the movement of interest rates, thereby maximizing profit opportunities from the interest rate predictions.

Literature review

The employment of interest rates to conduct monetary policy raises to prominence the role of the term structure of interest rates (Walsh 2003). The term structure spread, excluding term premiums, is a measure of monetary policy stance in relation to expectations in the long run. The EH is one of the oldest and well-known theories in finance and economics (Longstaff 2000). The theory dates as far back as the 1800s when it was introduced by Fisher (1896) and analysed by the likes of Macaulay (1938) and Malkiel (1966). Since then, it has gradually formed the basis for interest rate prediction and has been employed as a standard framework for the analysis of interest rates (Longstaff 2000). The EH is applicable in this study as it explicitly explains the relationship between the long rate and the short rate (Campa and Chang 1995). The theory holds that an ac-

cumulation of the expected future short rate average is equal to the long rate (Tabak, Serra, and Cajueiro 2009). It proposes that default-free bonds are priced so that the return on a long-term bond is the same as the expected return on repeated investments of short-term bonds (Cox, Ingersoll, and Ross 1985). Thornton (2014) compares the EH to default-free Treasury debt, stating that this kind of debt is perfectly substitutable across different maturities. The theory further explains that, over time, interest rates on bonds with different maturities move together, and that investors are mostly concerned about returns over the maturity of securities (Mishkin and Eakins 2006).

By offering a complete schedule of interest rates across time, the term structure embodies the market's anticipation of future events (Cox, Ingersoll, and Ross 1985). According to the EH, monetary policy is able to affect the long-term interest rate simply by influencing the short-term interest rates, which monetary policy is able to control, and also by altering expectations of future short-term interest rates in the market (Walsh 2003). However, the long-term interest rate is affected by more than one factor. For instance, its movement is influenced by economic activity and long-term expectations of inflation, and it is quite challenging to find a close empirical relation between the two interest rates (Estrella and Mishkin 1997). While monetary policy has a direct influence on the short-term interest rate, it tends to affect the long-term interest rate only through expectations (Estrella and Trubin 2006). Although a rise in the short-term rate is often followed by a relatively small rise in the long-term rate, this may not always be the case, as at times the long rate can move in a different direction without any coinciding movement in the short-term interest rates (Estrella and Trubin 2006). Thus, there is a limit, and the central bank is not able to have complete control over the spread between the two interest rates (Estrella and Mishkin 1996). Overall, the truism of EH is highly controversial.

As previously mentioned, studies of the EH have produced mixed outcomes, with studies conducted by MacDonald and Speight (1988) and Campbell and Shiller (1991) finding evidence in support of the theory. Further evidence supporting the theory includes studies by Batten, In, and Kim (2003), Holmes, Otero, and Panagiotidis (2011) and Thornton (2014). In the same vein, Velásquez-Giraldo and Restrepo-Tobón (2016), using one- (3-month), two- (3-month and 4-years) and three- (3-month and 4-years and 10-years) factor models, found the largest model to be the most appropriate for one- and five-day future forecasts. Similarly, Azar (2017) investigated fourteen types of securities with three months of maturity difference in the US using US T-bill yields, and they provided support for the validity of the EH for various securities. This implies the presence of informational efficiency and the absence of anomalies in the market. Ranaldo and Rupprecht (2017) studied European repurchase (repo) rates and found that the EH is valid when loans are secured by good collateral but violated in the presence of collateral risk. Moreover, Mwega (2014) evaluated the link between the term structure of 91- and 182-day treasury bill rates, and expected changes in expected inflation in Kenya. The study submitted that the future inflation rate can be predicted by the coefficients of the term structure.

Conversely, some studies (Duffee 2002; Diebold and Li 2006) point out the low performance of the theory as an issue that is likely caused by the inability to forecast the direction of short-term interest rates. Hence, Assenmacher-Wesche and Gerlach (2008) contend that the rejection of the EH is large in data with high fluctuation in short periods, and it tends not to hold information on the future movement of interest rates. Other studies that reject the theory include those of Fama (1984) Campbell and Shiller (1991), Bekaert, Hodrick, and Marshall (2001), Clarida et al. (2006), and Sarno, Thornton, and Valente (2007). More recently, Caldeira (2017) reinvestigated the EH in Brazilian debt securities and out-of-sample predictability of excess returns using macro-variables and zero-coupon interest rates. The study rejected the EH throughout the whole maturity spectrum examined and submitted that excess returns can be predicted by macroeconomic variables. Further, Mallick and Mishra (2019), using twelve types of rates, rolling principal component analysis and the ARIMA model in India, found that, based on the forecasting results, different maturities of interest rate yield increases with the maturity period.

In South Africa, Iyke (2017) assessed the correlations between interest rate series of short- and long-term maturities over time using the nonlinear STAR unit root test and the asymmetric cointegration with threshold adjustment test. The study submitted that central bank policy rate and long-term government bonds yield are co-integrated although the threshold adjustment is weak, while the direction of causality flows from treasury bonds yield to bank rate. Muzindutsi and Mposelwa (2016) also found that the EH holds in South Africa with the interest rate characterised by a high speed of conversion to the equilibrium. Meanwhile, Boukhatem (2016) questioned the validity of the EH in explaining Tunisian government bond yield. The results of cointegrated-VAR on different pairs of yields reveals that the EH is invalid when medium-term maturity spectrum is considered, but it becomes valid for the long-term maturity spectrum. Hence, the validity of the EH may be relative. Moreover, Tronzano (2018) evaluated the EH in the Philippines and found that interest rates at various maturities are co-integrated but without a significant risk premium. The study suggests that the EH may be valid, but the assumption of equal proportional yields cannot be observed.

Overall, the empirical findings on EH have been mixed, ranging from those in support and those that reject the hypothesis, while some others maintain the middle ground. Thus, a further study on the EH is required to shed more light on the topic, especially in the context of economic blocks.

Methodology

Data and sample period

The main focus of this study is on the short-term interest rate and the long-term interest rate channel, and the comparison of the relationship that exists between the two interest rates in BRICS and G7. To achieve this objective, this study employs secondary data consisting of monthly observations obtained from the 12 countries from May 2003 to May 2018. The selected period was based on the availability of data. For each of the observed countries, the study employs the 3-month Treasury-bill rate as the short-term interest rate and the 10-year government bond as the long-term interest rate, similar to Estrella and Mishkin (1998). Data employed are sourced from the Organisation for Economic Co-operation and Development (OECD) and the International Monetary Fund (IMF).

Model specification

In an effort to compare the two economic groups, the study employed the panel Autoregressive Distributed Lag (ARDL) model. The panel ARDL is advantageous because it can simultaneously estimate short- and long-run dynamics; it accommodates different orders of integration namely, (I(0), I(1) or a or mixture of I(0) and I(1) variables, but not variables integrated of order two or above; and it also accommodates a different number of lags on each variable (Shin, Yu, and Greenwood-Nimmo 2014; Kutu and Ngalawa 2016). We estimated three alternative panel ARDL approaches, namely, the Mean Group (MG), Pooled Mean Group (PMG) and Dynamic Fixed Effects (DFE) approaches. These approaches were considered because they provide consistent coefficients despite the possible presence of endogeneity as they include the lags of dependent and independent variables (Pesaran, Shin, and Smith 1999; Alsaleh and Abdul-Rahim 2019). The best estimator among the three approaches was selected based on the Hausman MG test. The general panel ARDL model is presented as follows:

$$y_{it} = \sum_{j=1}^{p} \phi_{ij} y_{i,t-j} + \sum_{j=0}^{q} \delta_{ij} X_{i,t-j} + \mu_i + \varepsilon_{it}, \quad (1)$$

where y_{it} denotes the dependent variable (long-term interest rate), the number of countries is $i = 1, 2, \ldots n$; the periods under observation $t = 1, 2, \ldots, T$; k x 1 vector of independent variables (short-term interest rates) is denoted by X_{it}; k x 1 coefficient vectors are denoted by δ_{ij}; ϕ_{ij} symbolises the scalars while the country-specific effect = μ_i and ε_{it} is the error term, where var(ε_{it}) = σ_i^2. If the cointegration of variables is I(1) process in equation (1), then for all i the error term is I(0) process. The co-integrated variables are assessed for their adjustment back to the equilibrium using

the error correction term (ECT). From Equation 1, a full model with for long-run and short-run dynamics with the ECT can be derived as follows:

$$\Delta Y_{it} = \alpha_1 Y_{i,t-1} - \alpha_2 X_{i,t-1} + \sum_{j=1}^{p-1} \delta_{ij} \Delta Y_{i,t-j} + \sum_{j=0}^{q-1} \gamma_{ij} \Delta X_{i,t-i} + \mu_t + \varphi ECT_{i,t-1} \varepsilon_{it}, \quad (2)$$

where φ captures the speed of adjustment, α_1 and α_2 indicate the long-run coefficients, while δ and γ are the short-run coefficients. To support the long-run association between the variables, the ECT coefficient should be significant and negative. It is expected that short-term interest rate shall have a directly proportional relationship with the long-term interest rate if the EH is valid.

Unit root and other diagnostic tests

To assess the validity of the expectations hypothesis of the two economic groups of countries, this study conducts a cointegration test, which proposes that there exists a long-run relationship between the long-term rate and the short-term rate that links the interest rates (Esteve 2006). Unit root tests were conducted to precede the cointegration tests, and the results indicate none of the variables is I(2). To save space, these results are not presented in this study. Pesaran's test of cross-sectional dependence was also conducted to test for the presence of common factors affecting the cross-sectional units, and the results showed that there is no cross-sectional dependence in either block (p-value is 0.0289 for BRICS and 0.0312 for G7).

Empirical analysis

Descriptive statistics

The descriptive statistics of both the short- and long-term rates for each country are presented in Table 1. The gap between the minimum and maximum values indicates that the long-term rates for each country have a higher value compared to that of the short-term rate. This is expected considering the higher risk which long term investors are compensated for. Also, the gap values between the interest rates of the others are not as wide as those of Brazil and Russia. This could be a reflection of the perceived lower risk, especially on the part of developed countries and the effect of the financial crisis that led to a rapid decline in interest rates. The mean values indicate that, on average, interest rates in emerging countries are higher than interest rates in developed countries, except for China. This could be due to the perceived high risk, volatile interest rate movements, and also because the interest rates in developing countries were not directly affected by the financial crisis. The long-term rates in all observed countries except for Brazil are, on average, higher than the short-term rates. This finding

is consistent with that of Modena (2008), who found that with longer-term maturity securities, the mean tends to be higher. The short-term rates in Brazil and Russia seem to have wider spreads as measured by the standard deviation, suggesting that the short-term rates in these countries are much more volatile.

Table 1. Descriptive statistics

a. Emerging Countries (BRICS)							
Country	Rate	Count	Min	Max	Mean	Std. Dev	Skewness
Brazil	Long Rate	157	6.5	16.36	11.33	1.84	–0.24
	Short Rate	157	0.19	24.52	12.51	4.16	–0.22
Russia	Long Rate	157	6.63	12.58	8.29	1.31	1.16
	Short Rate	157	2.2	27.83	7.99	4.06	1.95
India	Long Rate	157	5.06	9.17	7.55	0.95	–1.06
	Short Rate	157	3.18	10.94	6.65	1.73	–0.29
China	Long Rate	157	2.81	4.95	3.67	0.53	0.38
	Short Rate	157	–0.08	4.05	0.97	1.38	1.24
SA	Long Rate	157	6.37	10.39	8.40	0.82	0.31
	Short Rate	157	4.98	12.55	7.18	1.81	1.06

b. Developed Countries (G7)							
Country	Rate	Count	Min	Max	Mean	Std. Dev	Skewness
Canada	Long Rate	157	1.12	4.93	3.17	1.08	–0.20
	Short Rate	157	0.38	5.12	2.02	1.34	0.73
France	Long Rate	157	0.44	4.73	3.07	1.15	–0.81
	Short Rate	157	–0.25	5.11	1.68	1.52	0.73
Germany	Long Rate	157	0.12	4.56	2.70	1.31	–0.46
	Short Rate	157	–0.25	5.11	1.68	1.52	0.73
Italy	Long Rate	157	1.29	7.06	4.03	1.12	–0.64
	Short Rate	157	–0.25	5.11	1.68	1.52	0.73
Japan	Long Rate	157	–0.12	1.96	1.10	0.49	–0.48
	Short Rate	157	0.06	0.89	0.34	0.24	0.93
UK	Long Rate	157	1.59	5.43	3.55	1.17	–0.24
	Short Rate	157	0.48	6.58	2.55	2.17	0.41
US	Long Rate	157	1.50	5.11	3.29	1.05	–0.05
	Short Rate	157	0.11	5.49	1.63	1.88	1.02

Source: International Monetary Fund (2018) and Organisation for Economic Co-operation and Development (2018).

Panel results

The cointegration test for emerging economies and developed economies are presented in Table 2 and Table 3, respectively. Before interpreting the results, the Hausman MG test was used to decide the appropriate estimator between the MG, PMG and DFE.

Emerging economies results

Table 2 presents an ARDL cointegration test that is estimated at a constant level and the selected model (based on the Akaike Information Criterion). In the long-run equation, the p-value of the Hausman test is greater than 0.05, the Ho that the PMG estimator is efficient and consistent cannot be rejected. Thus, the PMG long-run results are interpreted. The results in Table 2 provide strong evidence of cointegration between the long and short-term interest rates in the emerging economies. The long-run equation is given by the statistically significant short-term rate coefficient of 0.197749, thus implying there exists a positive long-run relationship between the variables in the emerging economies. A change in the short-term interest rate will lead to a rise in the long-term interest rate of 19.77 percent in the long run.

Hence, the Hausman test compared the MG to DFE short-run estimators and the p-value of the Hausman MG test that is less than 1 percent, suggest that the short-run MG estimators are more suitable. The ECT coefficient of –0.076853 implies that there is an adjustment of approximately 7.69 percent back to equilibrium each month. Accordingly, it takes about 13.01 (1/0.076853) months for changes in the short-term interest rate to have a full effect on the long-run interest rate and thus restore the deviation back to the equilibrium state. This adjustment is rather lengthy, and it suggests that the short-run relationship between the long term and the short-term interest rates is not strong in the BRICS block.

Table 2. Panel ARDL results – emerging economies

		MG		PMG		DFE	
	Variable	Coeffic.	P-Values	Coeffic.	P-Values	Coeffic.	P-Values
LR Equation	SR	0.2315	0.0235	0.197749	0.0009	0.20193	0.0012
SR Equation	ECT	–0.07685	0.0000	–0.07756	0.0071	–0.07976	0.0089
	D(LR (–1))	0.19137	0.0000	0.1916	0.0002	0.19201	0.0003
	D(LR (–2))	0.00198	0.9740	0.00210	0.9371	0.00201	0.9280
	D(SR)	0.08587	0.1064	0.09612	0.1101	0.08497	0.1059
	C	0.48954	0.0000	0.47811	0.0003	0.49162	0.0001
L R: Hausman MG test, p-value = 0.219 **S R**: Hausman MG test, p-value = 0.009							

Source: International Monetary Fund (2018) and Organisation for Economic Co-operation and Development (2018).

Furthermore, the short-term interest rate coefficient of 0.085873 indicates that a change in the short-term interest rate leads to a positive change in the long-term interest rate in the short run. However, this coefficient is not statistically significant. Thus, the statistical insignificance of the short-term interest rate implies that, in the short run, the long-term interest rate does not respond to changes in the short-term rate. However, an increase in the long-term interest rate in the previous periods positively influences the long-term interest rate in the short run. Specifically, a change in the lag of long-term interest rate in the short run leads to a 19.13 percent increase in the long rate. The long rate that is lagged twice, on the other hand, is not statistically significant.

Developed economies results

For developed countries, the Schwarz Information Criterion (SIC) is used for optimal lag selection as it has the lowest value, and the selected model is (2,1). The ARDL cointegration test is estimated with a constant, and the outcome is presented in Table 3. For the long-run estimates, the p-value of the Hausman test is greater 0.05, the Ho that the PMG estimator is efficient and consistent cannot be rejected. Thus, the PMG long-run results are interpreted. The long-run equation of the developed countries implies that there is a strong positive relationship between the observed variables in the long-run as the short-term interest rate coefficient is statistically significant at 1 percent. An increase in the short-term rate will lead to a rise in the long-term rate of 47.32 percent in the long run.

Table 3. Panel ARDL results – developed countries

		PG		PMG		DFE	
	Variable	Coeffic.	P-Values	Coeffic.	P-Values	Coeffic.	P-Values
LR Equation	SR	0.48416	0.0010	0.47329	0.0000	0.469211	0.0009
SR Equation	ECT	–0.02483	0.0000	–0.02761	0.0010	–0.03015	0.0008
	D(LR (–1))	0.23913	0.0000	0.2132	0.0005	0.19201	0.0003
	D(SR)	0.17027	0.0000	0.16810	0.0010	0.15934	0.0002
	C	0.05012	0.0009	0.04921	0.0011	0.04870	0.0010
L R: Hausman MG test, p-value = 0.341 **S R:** Hausman, MG test, p-value = 0.012							

Source: International Monetary Fund (2018) and Organisation for Economic Co-operation and Development (2018).

For the short-run equation, the Hausman test is used to compare the PG and DFE estimators. Since the p-value of the Hausman test is statistically significant at the 1 percent level of significance, the short-run MG estimators are more suitable. The results indicate that there is correction back to equilibrium in the short run as the ECT is negative and statistically significant, as desired. The –0.024825 coefficient means that roughly 2.48 percent of deviations from equilibrium are corrected every month. Thus, changes in the short-term interest rate take 40.28 months (1/0.024825) to have a full effect on the long-term rate. This suggests that the adjustment towards equilibrium is sluggish in developed countries. Furthermore, in the short-run, changes in the short-term interest rate and long-term interest rate in the previous period, have a significant and increasing effect on the long-term interest rate. They lead to a 17.03 and 23.91 percent increase in long-term interest rate, respectively.

Discussion

Using panel data estimation methods, the BRICS and G7 countries are pooled accordingly, and the findings are similar in both groups, especially in the long- run. As with most tests for cointegration, a unit root test is conducted to check whether or not the series

are stationary. Cointegration for both groups is confirmed by the significant coefficient in the long-run equation. The short-run effects, on the other hand, differ between the two groups. The long-term interest rate does not respond to changes in the short-term interest rate when BRICS are pooled together in the short-run. However, the long-term interest rate does respond to changes in the short-term interest rate in G7.

There is a vast amount of difference in the speed of the adjustment to the equilibrium and its behaviour between the two groups. For emerging economies, the full adjustment of 13.01 months is relatively lengthy, although it is faster than that of developed countries where adjustment back to equilibrium is sluggish at 40.28 months. These findings suggest that a shock in the short-term interest rate has a quicker and larger effect on the long-term interest rate in emerging economies than developed countries.

Given the backdrop of global financial interdependence in the markets, overall, the results indicate that there is co-movement in the term structure of interest rates among developed countries. This outcome is not surprising given the integration of financial markets and central banks, particularly in Europe. Major events in developed countries have led to a shift in the conduct of monetary policy, with the employment of non-conventional monetary policy methods. Zero bound and negative interest rates in the United States and the euro area, respectively, led to the inflow of capital in emerging economies since interest rates remained relatively higher in emerging economies compared to developed countries. The results in both blocks suggest that the central bank is able to influence the long-term interest rate by changing the short-term interest rate. This is consistent with the studies conducted by Walsh (2003), Bonga-Bonga (2012) and Thornton (2014).

Emerging economies, on the other hand, are not immune to the major events that occurred in developed countries; the term structure of interest rates in emerging economies seems to have merely reacted to the effects of the financial crisis. The results indicate the impact of global financial integration in the markets on the observed countries' term structures. There is significant evidence suggesting that domestic term structures of interest rates are influenced by foreign monetary policy and foreign term structures as a consequence of integration and liberalization of financial markets (Holmes, Otero, and Panagiotidis 2011). Since long-term government bonds provide a safe haven for investors in times of uncertainty in financial markets (Bernanke 2013), the capital inflows that surged in emerging economies post the financial crisis following the uncertainty in the developed countries provide evidence of this feature. This is in agreement with the study of Holmes, Otero, and Panagiotidis (2011), where domestic term structures of interest rates are influenced by foreign monetary policy and foreign term structures as a consequence of integration and liberalization of financial markets.

Concluding remarks

This paper examines the validity of the expectations hypothesis in two economic groups of countries, namely, the BRICS and the G7, and it also investigates the predictability of the term structure of interest rates. Using the panel ARDL, the results show that the expectations hypothesis holds in both BRICS and G7 country groups. This means that the short-term interest rate can be used to predict the long-term interest rate in both the BRICS and G7 countries. The interesting finding of this study is that the interest rates in BRICS indicate rapid adjustment back to long-run equilibrium; while the adjustment is sluggish in the G7 block. The implication of this finding is that the central bank is able to influence the long-term interest rate by changing the short-term interest rate, thereby affecting economic activity via the response of the long-term interest rate. Thus, the short-term interest rate has a greater effect in the emerging economies than the developed ones, suggesting that the use of short-term interest as a tool to influence economic activity is likely to be more successful in emerging economies as opposed to developed countries.

The finding in this paper is thus consistent with the implication of the EH, as the short-term interest rate is found to be an important component in the interest rate dynamics. The validity of the expectations hypothesis in the analysis also proved that the theory is still valuable for the analysis of interest rates. It is able to assist market participants to predict the future direction of interest rates using the term structure of interest rates. This study assumes a constant relationship throughout the sample period, but this may not always be the case. Thus, future research could explore whether or not the EH changes with the changes in economic or market conditions. Additionally, a re-examination of the EH dynamics during the period of COVID–19 may shed more light on the topic.

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Analiza porównawcza hipotezy oczekiwań struktury terminowej stóp procentowych między krajami BRICS i G7

W artykule dokonano analizy zdolności predykcyjnej hipotezy oczekiwań struktury terminowej stóp procentowych w krajach BRICS i G7, porównując miesięczną stopę oprocentowania trzymiesięcznych bonów skarbowych każdego kraju ze stopami oprocentowania 10-letnich obligacji skarbowych w okresie od maja 2003 do maja 2018. Model panelowy ARDL, wykorzystujący estymatory Mean Group (MG), Pooled Mean Group (PMG) i estymatory modelu dynamicznego z efektami stałymi (DFE), posłużył do porównywania krótko- i długookresowych relacji w obu grupach krajów. Wyniki pokazują, że hipoteza oczekiwań jest prawdziwa zarówno dla grupy krajów BRICS, jak i G7. W dłuższej perspektywie krótkoterminowa stopa procentowa pozwala przewidzieć długoterminową stopę procentową zarówno w krajach BRICS, jak i G7. Stopy procentowe w krajach BRICS wskazują na szybką korektę i powrót do długookresowej równowagi, podczas gdy w bloku G7 korekta następuje powoli. Powolne dostosowywanie się do równowagi w krajach grupy G7 sugeruje, że kryzys finansowy wpłynął na strukturę terminową stóp procentowych gdyż kraje G7 zostały bezpośrednio dotknięte kryzysem.

Słowa kluczowe: Hipoteza oczekiwań, model panelowy ARDL, G7, BRICS, struktura terminowa

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The Restructuring of the European Pharmaceutical Industry between 2000 and 2018[1]

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Abstract

To meet the requirements of global competition, the European Union (EU) places particular emphasis on the development of knowledge-intensive, innovative industries. The pharmaceutical industry, as a high-tech manufacturing subsection, has a long tradition in Europe. However, the distribution of pharmaceutical industry employment and value added is not even within the Union, and its temporal dynamics is also different.

In the present paper, I examine the change of the structure of the pharmaceutical industry within the Union using country groups. I compare the development of pharmaceutical industry employment in the period between 2000 and 2018 in three country groups. I use a simple decomposition method to separate the effects of sector growth and labor productivity change on the change of pharmaceutical employment to find out how similarly this industry evolved in the different country groups. The analysis shows that while in the 12 original, i.e., pre–2004, member states (Core EU), employment slightly increased alongside a considerable increase in value added, the nine post-socialist countries (PS9) achieved slightly greater value added expansion combined with substantial employment growth. Meanwhile, the four Visegrád countries (V4) achieved a value added growth similar to the PS9, but an even greater employment growth. This indicates that the part of the pharmaceutical industry operating with higher labor productivity is concentrating in the Core EU countries, while in the less developed post-socialist countries, the part of the pharmaceutical industry with lower labor productivity is developing.

Keywords: pharmaceutical industry, labor productivity, growth, Visegrád countries

JEL: I18, L65, O14

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Introduction

The European pharmaceutical industry employed close to 600,000 people in 2018, and its output contributed about 100 billion euros to GDP in real terms of 2005.[2] Within the global pharmaceutical industry, the European pharmaceutical industry is the second most important, lagging behind the Asian but ahead of the North American (Albu et al. 2016). The transformation of the global economy (development of global value chains, the start of the 4th industrial revolution) also affected the European manufacturing industry. The outsourcing of more labor-intensive activities with low value added resulted in a kind of deindustrialization in the European Union (EU) (Fujita and Thisse 2009; Coad and Vezzani 2017).

At the same time, a new ambition of the Union is to "revive" industry through the Europe 2020 strategy announced in 2010 (European Commission 2010), and one of its objectives is to increase the share of the manufacturing industry to GDP from 15% to 20%. According to researchers of reindustrialization, the main engine of economic growth is the manufacturing industry (Tregenna 2013; Cantore et al. 2017). Thus its growth in terms of employment and produced value added stimulates slowed-down economic growth. Nevertheless, it is not sufficient to support and encourage the development of the manufacturing industry in general, and the Union, reading the signs of the time, does not simply aim for this but focuses on smart, sustainable, and inclusive growth (European Commission 2010), the digitalization of the industry, and the full-fledged utilization of the potentials of a single digital market (European Commission 2016). Consequently, the development of the manufacturing industry is of great importance to the Union, prioritizing a knowledge-intensive, high-tech manufacturing industry that builds on state-of-the-art technology. These characteristics perfectly describe the pharmaceutical industry.

In this paper, I aim to present the development of the European pharmaceutical industry. The analysis is mainly descriptive when I analyze the temporal development of some key variables defining the pharmaceutical industry in the EU and its three country groups. I study the causes of the change in the number of persons employed in the pharmaceutical industry only insofar as the decomposition method widely applied in the reindustrialization literature allows.

Before analyzing the temporal changes in production, employment, and labor productivity in the pharmaceutical industry, I would like to briefly introduce some unique aspects of the pharmaceutical industry as a special manufacturing subsection.[3] In terms of the demand side, a special characteristic of the market is that the actual decision-maker is not the final consumer but the doctor prescribing the medicinal

2 The source of data is the EUROSTAT, see below.

3 About global pharmaceutical market, see Schweizer and Lu (2018). Furthermore, a research report prepared for the Commission (ECORYS 2009) provides details about the EU pharmaceutical market and its actors.

product.[4] At the same time, neither of them bears the total costs directly, but a significant part is borne by various national health insurance systems. In terms of the supply side, one significant characteristic of the market is the (price) competition between two specific groups of actors: the innovative pharmaceutical companies and the producers of generic products.

One important task of innovative producers is to develop and market new medicinal products, active substances, and molecules, which require considerably higher research and development expenses compared to other manufacturing industries. In the protection of new knowledge produced by R&D, the pharmaceutical industry relies heavily on patent protection. Cohen, Nelson, and Walsh (2000) pointed out that the pharmaceutical industry is where this kind of intellectual property rights plays the most prominent role. Therefore, innovative manufacturers can delay generic producers' entry to the market by optimizing their patenting strategy while generating the highest possible income. In the final report of the inquiry into the pharmaceutical industry sector started in 2008,[5] the European Commission established that innovative manufacturers restrict competition, and thereby the innovative capability of the industry decreases, although this statement is debated by members of the innovative sector.[6]

The pharmaceutical industry is further characterized by being strongly concentrated; the above-mentioned sector inquiry asked 43 innovative and 27 generic manufacturers, and they produced 80% of the relevant Union turnover. Patents are not the only reason why this market can be considered strongly regulated: the producers can often sell their products at officially determined prices (Garattini, Curto, and Freemantle 2016). Not to mention the strict regulations on testing and introducing medicinal products developed for human treatment (which is one of the reasons why the development period of new medicinal products is 10–15 years and costs about 1 billion euros[7]).

The Commission document, based on the findings of the inquiry, highlights three important areas for building the strategic vision for the pharmaceutical industry: advancement towards a unified and sustainable pharmaceutical market, addressing the possibilities and challenges represented by globalization, and putting science in the service of European patients (European Commission 2008, p. 4). The Commission directive outlines the Union's action plan related to the pharmaceutical industry along 22 specific objectives, the first area of which is targeted at changing the regulatory environment to be more favorable for the sector. The second area refers to the management of changing market environment created by global competition, while the third area is about research and development. The Commission expresses its conviction that

4 Of course, the consumer, i.e., the patient, can still decide not to get their prescription filled (Vajda, Horváth, and Málovics 2012).

5 http://ec.europa.eu/competition/sectors/pharmaceuticals/inquiry/communication_hu.pdf (accessed: 29.05.2018).

6 For example, Arthur Higgins, President of European Federation of Pharmaceutical Industries and Associations (EFPIA) (*Presentation of the Preliminary Report*..., 2008).

7 From Higgins's presentation referred to above.

the EU has the appropriate instruments to create a dynamic and competitive pharmaceutical industry sector: "a strong research base, a renowned education system and skilled workforce, a well-established and innovative EU-based industry." (European Commission 2008, p. 16). Around the very beginning of the global financial crisis, the pharmaceutical industry reached a so-called patent cliff, i.e., in a short period, many patents related to basic medicines and molecules expired, opening the way for generics with a lower price. However, due to the continuous aging of the European continent, extensive community funding, and the low price sensitivity of the demand for pharmaceutical industry products, the decline of the EU's pharmaceutical industry failed to happen, and analysts do not expect it to take place in the near future (European Commission 2014).

The situational picture of the manufacturing, high-tech manufacturing, and pharmaceutical industries

The pharmaceutical industry is one of the high-tech manufacturing subsections within the manufacturing industry (section C).[8] Below, I examine the development of gross value added (GVA) and employment in the total national economy, manufacturing, its high-tech subsections, and the pharmaceutical industry, and with their help, I look at the temporal change of two additional indicators, labor productivity and share within a larger unit (e.g., that of the pharmaceutical industry within high-tech subsections). The basic data are from Eurostat nama_10_a64 (value added) and nama_10_a64_e (employment) databases.

In the examination of the development of these indicators, I break down the entire Union into country groups and then separate and compare three groups: the twelve original member states (Core EU),[9] nine post-socialist member countries (PS9),[10] and the four Visegrád countries (V4).[11] It needs to be noted in the following analysis that the group of V4 countries is a subset of the PS9 countries. The analyzed period is be-

8 High-tech industries in the two-digit NACE Rev.2. classification are defined as the C21 (pharmaceutical industry) and C26 (manufacturing of computer, electronic and optical products) subsections by Eurostat.

9 National data about the pharmaceutical industry GVA are not available for Sweden and Luxembourg, so they are excluded from the sample. National data for Ireland are only available up to 2014, so I decided to exclude Ireland as well. For the years that consolidated EU15 data are available from Eurostat, the pharmaceutical industry of the remaining 12 countries (Denmark, Germany, Greece, Spain, France, Italy, Netherland, Austria, Portugal, Finland and the United Kingdom) together makes up 82–86% of EU15 pharmaceutical GVA figure and 91–95% of the EU15 employment figure.

10 For Estonia, there is no data related to the pharmaceutical industry, thus I analyzed the indicators of the remaining nine post-socialist member states (Bulgaria, Czechia, Latvia, Lithuania, Hungary, Poland, Romania, Slovenia, and Slovakia).

11 These are Czechia, Hungary, Poland and Slovakia.

tween 2000 and 2018. For a description of the long-term evolutional history of the pharmaceutical industry, see Malerba and Orsenigo (2015).

First, let us look at the development of employment in the different country groups at different NACE Rev. 2 levels. While total employment increased to an almost identical extent in the Core EU and in the V4 countries over the course of the examined 18 years (by about 13%), in the PS9 countries, it was about a fourth of this rate (by 3%). Manufacturing employment significantly increased in the V4 countries (by 10%), while in the PS9 countries, it stagnated, and in the Core EU countries, it decreased about 17%. The change in employment in the high-tech sectors shows a similar pattern: 8% growth in the V4 countries, smaller growth (4%) in the PS9 countries, and a dynamic decline (18%) in the Core EU countries. Pharmaceutical industry employment saw an 8% increase in the Core EU countries, a 20% increase in the PS9 countries, and a spectacular 35% increase in the V4 countries. In terms of employment, the pharmaceutical industry is a dynamically developing subsection in the V4 and PS9 countries, its growth exceeding that of the high-tech sector, the total manufacturing industry, and the total national economy. While in manufacturing employment there was a strong decrease for each country group in 2008–2010 with not much of a recovery, pharmaceutical employment – especially in the new member states – follows a different path. There is dynamic growth between 2002 and 2009, a sudden fall in 2010, and then a quick recovery until 2012.

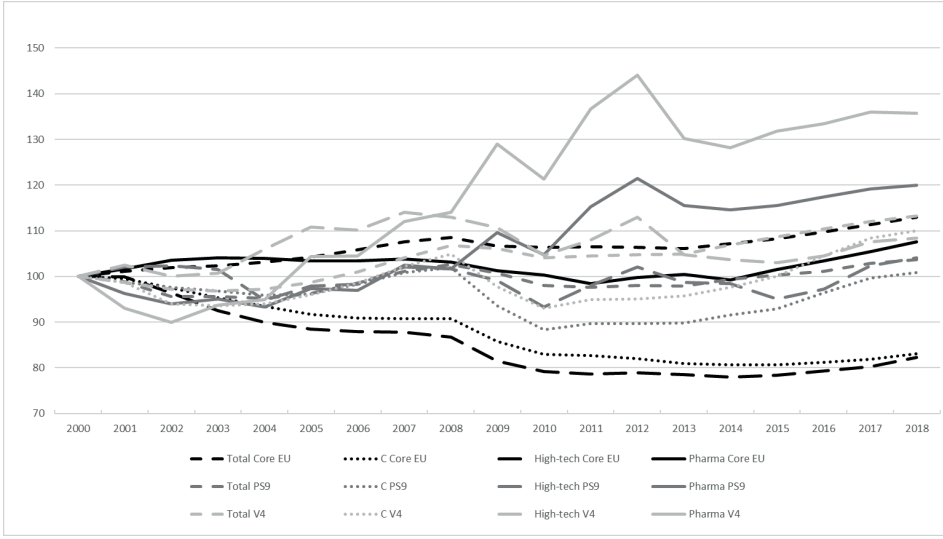

Figure 1. Comparing the employment growth of country groups, 2000–2018 (2000 = 100)
Source: Eurostat nama_10_a64_e.

The development of value added is illustrated in Figure 2. The development of the total national output indicated by the briefly dashed line provides the benchmark. The values of the PS9 and V4 countries move closely together in this respect, and the

value added of the national economy of these two groups increases to a larger extent compared to the Core EU country group. In the manufacturing industry (dotted line), the difference is even more evident. The manufacturing industry of the Core EU showed very small growth throughout the examined period (18% over 18 years), while in the two other country groups, the growth of the manufacturing industry is of much greater extent (156% in the PS9 group, and 157% in the V4 group). The impact of the crisis is evident on the manufacturing performance of each country group in 2009, and each decreased to a greater extent than total GVA. Pharmaceutical GVA fell a little in the Core EU countries during the financial crisis and has grown slowly but steadily ever since. In the PS9 and V4 pharmaceutical output, however, there was dynamic growth until 2010, then basically a stagnating period until 2017. The strongest growth can be seen in high-tech manufacturing subsections: this value is the highest for each country group, and it is particularly high in the PS9 countries but even more so in the V4 countries. The growth of the pharmaceutical industry falls short of these outstanding values, indicating that within the high-tech subsections, the key sector is not pharmaceuticals.

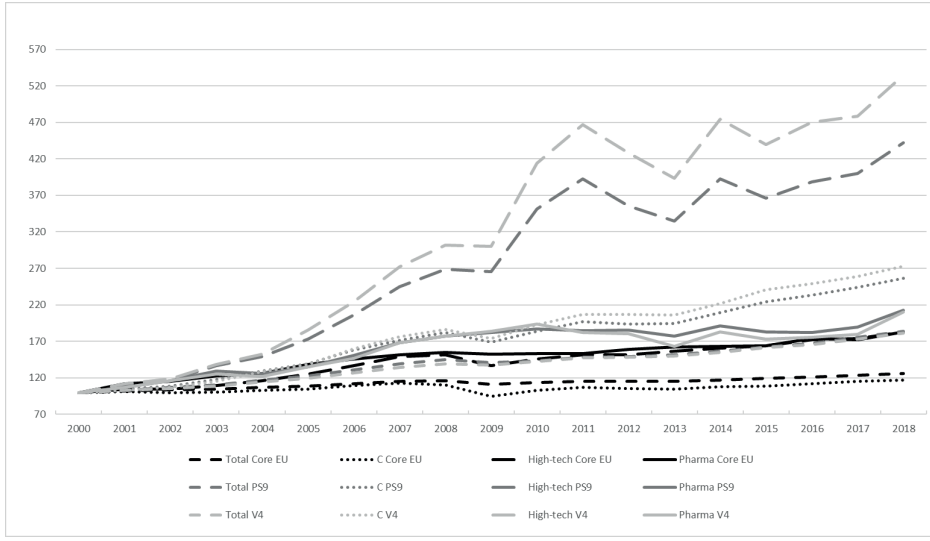

Figure 2. Comparing the GVA growth of country groups in real terms of 2005, 2000–2018 (2000 = 100)
Source: Eurostat nama_10_a64.

We can analyze two additional indices with the help of employment and value added data. First, let us look at the development of labor productivity calculated as value added per person employed.

In the assessment of the differences found in the growth of labor productivity, it has to be kept in mind that each country group started from quite different bases: the Core EU had a 4–6-fold labor productivity advantage in 2000 compared to the PS9

countries, and somewhat less compared to V4 countries. In terms of the total economy, in the manufacturing industry, and high-tech manufacturing subsections, in particular, labor productivity grew to a greater extent in the PS9 and V4 countries than in Core EU, and the gap in labor productivity decreased in these categories. In the case of the pharmaceutical industry, however, even though the GVA growth in the PS9 and V4 countries exceeded that of the Core EU, the fourfold labor productivity advantage of Core EU in 2000 decreased slightly vis-à-vis the PS9 countries by 2018, and even increased to a fivefold advantage against the V4 countries. Finally, let us examine how the shares of the manufacturing, high-tech manufacturing, and pharmaceutical industries developed in terms of both employment and value added.

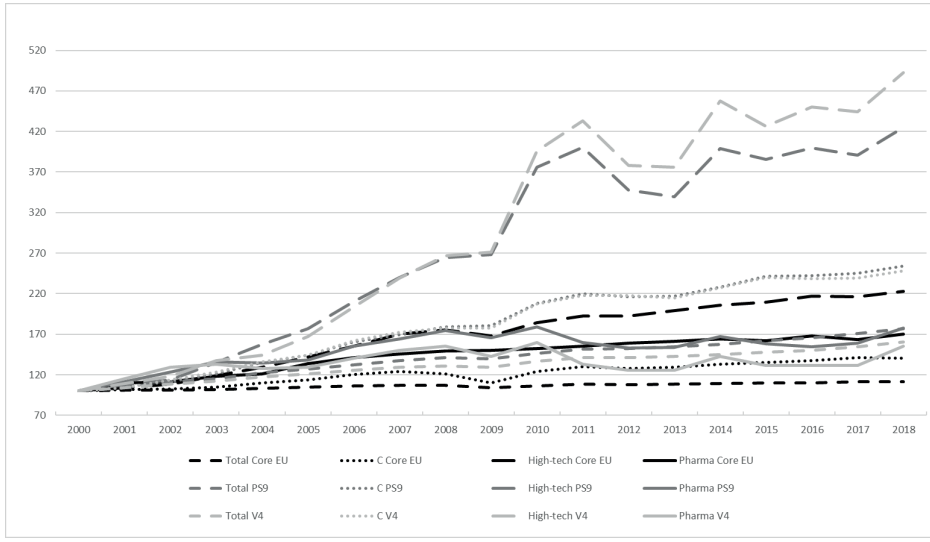

Figure 3. Development of labor productivity (value added per person employed) in the examined country groups (2000 = 100)
Source: Eurostat nama_10_a64 and nama_10_a64_e.

Table 1. Comparing country groups based on their share (%) of the manufacturing, high-tech manufacturing, and pharmaceutical industries

		Employment				GVA			
		2000	2008	2010	2018	2000	2008	2010	2018
The manufacturing industry within total national economy	Core EU	16.6	13.9	12.9	12.2	18.4	15.6	14.8	15.1
	PS10	21.1	21.0	19.0	20.6	20.6	20.6	20.0	20.6
	V4	22.6	22.2	20.2	21.9	20.6	20.5	19.6	21.1
The high-tech manufacturing industry within manufacturing	Core EU	5.7	5.4	5.4	5.6	10.4	10.6	10.8	10.4
	PS10	4.5	4.5	4.8	4.7	6.5	6.8	7.7	6.6
	V4	4.9	5.3	4.6	4.9	6.3	7.1	7.6	7.1

Table 1. (continued)

		Employment				GVA			
		2000	2008	2010	2018	2000	2008	2010	2018
The pharmaceutical industry within the manufacturing industry	Core EU	1.5	1.7	1.8	1.9	4.0	5.0	5.3	5.2
	PS10	1.0	1.0	1.2	1.2	2.6	2.4	2.8	2.5
	V4	1.0	1.1	1.3	1.2	2.4	2.4	2.9	2.5

Note: GVA shares are calculated from nominal GVA
Source: Eurostat nama_10_a64 and nama_10_a64_e.

We can see that while in the Core EU the share of the manufacturing industry decreased in both value added and employment, the PS9 and V4 countries are characterized by a slightly increasing share of the manufacturing industry in value added, coupled with a similarly small decrease in employment share. Within the manufacturing industry, the high-tech subsections produce a higher share of value added, but they employ a decreasing share of people (as is also indicated by the growing labor productivity seen earlier). On the other hand, the pharmaceutical industry's share is increasing in both employment and value added within the manufacturing industry in all three country groups. The pharmaceutical industry in the Union, however, is not only important because it produces value added or employs people but is also an important contributor to exports. Between 2000 and 2018, the Core EU countries' export of the manufacturing industry increased from 1944 billion euros to 3524 billion euros (which is an increase of about 80%), while their pharmaceutical industry exports expanded from 65 billion euros to 282 billion over the same period (which means an expansion of 330%) (EUROSTAT[12]). While the global financial crisis halted the growth of manufacturing exports in all country groups, pharmaceutical exports continuously grew during the whole period.

Reindustrialization or deindustrialization: growth or decline

The reindustrialization literature mostly defines reindustrialization or deindustrialization in terms of the above-examined indicators, value added and employment. Reindustrialization or deindustrialization can only be shown for the entire manufacturing industry; this concept cannot be interpreted in the case of a single subsection. The method of decomposition, however, can be applied to a subsection to present its course of development. Here, I examine the evolution of the indicator for the level of persons employed.

The decomposition breaks down the percentage growth of employment in the pharmaceutical industry subsection into two components: labor intensity effect (by what percentage and in what direction employment changed only because labor produc-

12 Online data code: DS–018995.

tivity changed in the subsection) and sector growth effect (by what percentage and in what direction employment changed only because the subsection produced higher value added) according to the following formula:

$$\frac{L_{t+1}-L_t}{L_t}\cdot 100=\left[\left(\Phi_{t+1}-\Phi_t\right)\left(\frac{Q_{t+1}+Q_t}{2}\right)\cdot\frac{100}{L_t}\right]+\left[\left(Q_{t+1}-Q_t\right)\left(\frac{\Phi_{t+1}+\Phi_t}{2}\right)\cdot\frac{100}{L_t}\right],$$

where $\Phi = L/Q$ is labor intensity, the reciprocal of labor productivity. For more technical details of the method, see Tregenna (2013) or Nagy and Lengyel (2016). The first term of the sum on the right is the labor intensity effect, and the second is the sector growth effect. A negative labor intensity effect indicates improving labor productivity; thus, it results in a decrease in employment (fewer employees could produce the same value added). A negative sector growth effect shows the shrinkage of the subsection, and it also results in a decrease in employment (lower value added can be produced by fewer people employed). It should be noted that, in a similar way, Cantore et al. (2017) conducted a decomposition of value added growth into the number of employees and labor productivity components, while McMillan and Rodrik (2011) used the decomposition of labor productivity into the factors of value added and the number of employees. The indicators used are identical in each of these papers, and the basic idea of the method is also the same; the main difference is in the selection of the indicator to be decomposed. The decomposition method is more of a descriptive method, not appropriate for discovering causal relationships.

Table 2. Change and decomposition of employment (%)

	2000–2008			2010–2018		
	Change of employment in %	Labor intensity effect	Sector growth effect	Change of employment in %	Labor intensity effect	Sector growth effect
CoreEU	3.2	–42.2	45.4	7.3	–11.3	18.5
V4	14.1	–49.1	63.2	11.9	3.1	8.8
PS9	1.6	–59.3	60.9	14.5	0.8	13.7
CZ	42.8	4.0	38.8	11.2	–5.4	16.6
HU	–25.9	–67.1	41.2	–3.0	12.2	–15.2
PL	99.3	–25.3	124.6	23.6	–5.4	29.1
SK	–38.8	–56.8	18.0	–2.2	39.3	–41.5
BE	25.7	–26.5	52.2	25.7	–5.3	31.0
DK	54.5	18.9	35.6	33.3	–56.0	89.3
D	7.3	–53.8	61.0	12.7	–5.7	18.4
GR	32.2	36.6	–4.4	–19.6	–34.7	15.1
E	8.3	–61.4	69.7	6.9	–36.9	43.8
F	19.6	–32.7	52.3	–8.0	–26.9	18.9
I	–5.1	–33.8	28.6	–0.2	–12.4	12.2
NL	0.0	–19.4	19.4	–18.8	–56.7	38.0

Table 2. (continued)

	2000–2008			2010–2018		
	Change of employment in %	Labor intensity effect	Sector growth effect	Change of employment in %	Labor intensity effect	Sector growth effect
A	4.9	–3.2	8.0	37.4	6.6	30.8
P	–23.3	–42.8	19.5	33.7	–14.2	47.9
SF	–2.2	–57.0	54.8	15.0	–30.4	45.4
UK	–26.2	–61.6	35.4	6.2	33.6	–27.5
BG	–32.3	–50.4	18.1	24.0	–22.9	46.9
LV	4.7	–91.1	95.8	17.6	10.8	6.8
LT	–21.6	–24.7	3.1	190.0	160.0	30.0
RO	–27.8	–60.5	32.8	–1.4	1.2	–2.6
SLO	7.4	–70.5	77.8	37.4	8.1	29.3

Source: own construction based on Eurostat data and own calculations.

The comparison of country groups shows that Core EU, PS9, as well as V4 countries, have improving labor productivity and a growing pharmaceutical industry subsection in the period before the crisis. As a result of these two changes affecting employment in the opposite direction, pharmaceutical industry employment increased in all country groups. Nevertheless, the situation considerably altered after the crisis. In the Core EU countries, pharmaceutical employment still increased with improving labor productivity, with value added increasing to a much smaller extent than in the first period. Although employment increased in the post-socialist and Visegrád countries, the factors causing this have changed a great deal: pharmaceutical sector growth was much smaller than in the first period, while productivity growth almost disappeared (small positive labor intensity effect, see also Figure 3).

By putting the two effects on coordinate axes, we can compare the development of the pharmaceutical industry in the examined country groups and countries more graphically. By putting labor intensity effect on the horizontal axis and sector growth effect on the vertical axis, the observations can be easily categorized. In the countries that are above the straight line passing through the origin with a slope of –1, the total effect is positive, i.e., pharmaceutical industry employment grows in the examined period. In the countries below the straight line, pharmaceutical industry employment decreases.

The countries above and below the straight line can be further divided into three subcategories. In those countries above the straight line but located in the second quadrant (for example, Belgium or Slovenia in Figure 4), employment increases concomitantly with improving labor productivity. We can consider this to be the most favorable type of growth. Less favorable is the type of growth when the subsection GVA grows in parallel with decreasing labor productivity. The point signifying the countries that show such growth would be in the first quadrant (Czechia and Denmark). The most unfavorable type of subsection employment growth is when decreasing value added is paired with, and is offset by, declining labor productivity (such as in the

case of Greece). Decreasing subsection employment, i.e., the decline of the subsection, can also be described in three ways. The most favorable case is when labor productivity improves and value added expands, but the latter effect cannot overcompensate for the former. Countries experiencing such an employment decline will be under the straight line in the second quadrant in Figure 4 (e.g., Hungary or the United Kingdom). If improving labor productivity is combined with decreasing subsection GVA, they are placed in the third quadrant. The subsection declines in the most unfavorable way if it can be characterized by deteriorating labor productivity and decreasing value added; in this case, the country is located in the fourth quadrant below the indicated straight line. There are no countries belonging to the last two categories in the period before the crisis. The majority of the analyzed countries are found in the second quadrant, suggesting that the pharmaceutical industry is increasingly less labor-intensive, and labor productivity is increasingly higher.

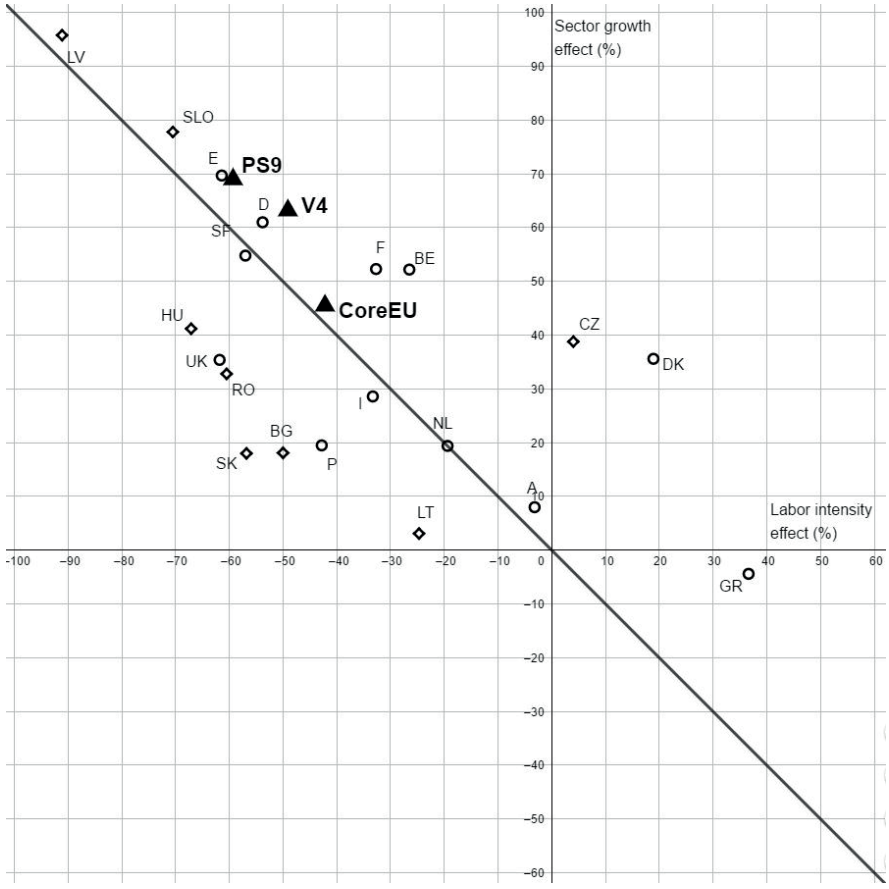

Figure 4. The examined countries and country groups based on labor intensity effect and sector growth effect (2000–2008)
Source: own construction based on Eurostat data and own calculations.

After the crisis, the analyzed countries show a much more diverse development pattern. We can find example countries in five of the six above mentioned categories in the period of 2010–2018.

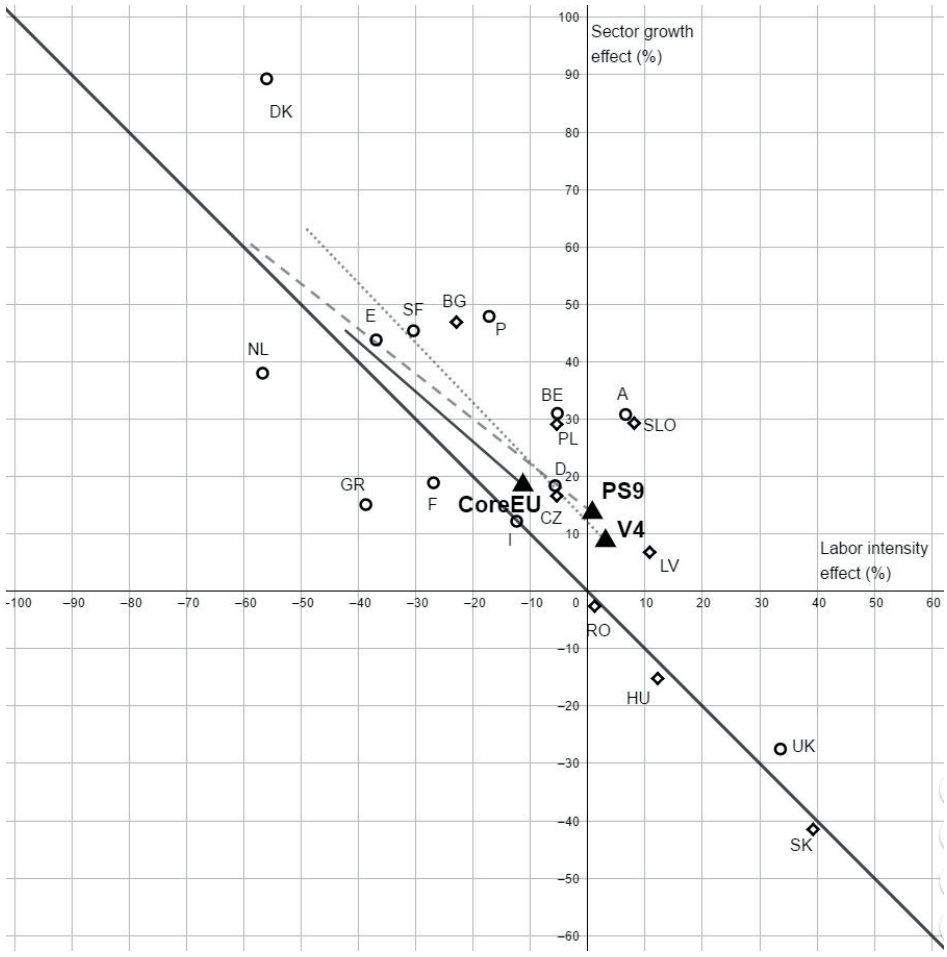

Figure 5. The examined countries and country groups based on labor intensity effect and sector growth effect (%, 2010–2018)

Note: lines from the CoreEU, PS9, and V4 groups show the movement of these data points from the previous period

Source: own construction based on Eurostat data and own calculations.

The most favorable growth is still experienced by, for instance, Belgium, Denmark, and Portugal. However, these countries have quite a low share of the Union's pharmaceutical industry employment (and also of GVA). While this continuous growth can be useful from the perspective of the individual country (the pharmaceutical industry is relatively overrepresented in Belgium and Denmark), from the perspective of the

entire Union's pharmaceutical industry, it is less significant. What happens with the pharmaceutical industry in Germany may be much more important, as it provided 30% of the Core EU's pharmaceutical industry employment by 2018. In Germany, the C21 subsection shows growth in employment consistently higher than the Core EU, as a combination of decreasing labor productivity and increasing value added in both periods: as mentioned above, this is the most favorable type of employment growth pattern. The V4 country group, including Poland (where 58% of people employed in the pharmaceutical industry of V4 countries worked in 2018), shows the second most favorable growth pattern, i.e., growing employment as a combination of growing output and decreasing labor productivity.

Pharmaceutical industrial powers like the United Kingdom, Italy, and France (which are the second-, third-, and fourth-largest pharmaceutical employers in the Core EU) show less favorable development patterns: UK employment grows, but becomes less productive, while the Italian and French pharmaceutical industries become more productive, but their employment shrinks. Greece and the Netherlands are also in the same category as Italy and France, but as their weight in the Core EU pharmaceutical industry is low (the two together represent about 5% of pharmaceutical employment), even their significant employment decrease does not affect the whole Core EU group much. In contrast, Hungary's pharmaceutical industry represents a significant weight within the V4 countries (29% of employees), and the pharmaceutical industry itself has a larger weight than the V4 average in the country's manufacturing industry.

The graphical representation of the evolution of an industry in different countries and comparing different periods allows one to identify development patterns. Countries that are closer together develop in a similar fashion. If countries in a country group are more spread out, their evolution is much more diverse.

The numbers in Table 2 and the two effects that explain the percentage change in the number of people employed in the pharmaceutical industry reveal important information about the development of the pharmaceutical industry. However, when assessing the points that signify each country and country group in the graphical representation above, the following factors should also be taken into consideration:

- How far (and in what direction) is a given point from the negative 45-degree straight line? A greater distance indicates a greater percentage change in pharmaceutical industry employment.
- To what extent does the position of the point change between the periods? Out of the 24 examined points, for five points, both coordinate components (labor intensity effect and sector growth effect) changed sign between the periods, i.e., the development pattern of the pharmaceutical industry substantially changed in several countries.
- How important is the country in terms of the pharmaceutical industry? For example, although Lithuania shows a spectacular three-fold increase in employment in the pharmaceutical industry between 2010 and 2018, it is still not particularly concerning from the perspective of the entire EU, given that only 1%

of pharmaceutical industry employment within the PS9 countries is realized in Lithuania.
– How significant is the pharmaceutical industry within the country's manufacturing industry? For example, the Greek pharmaceutical industry employs a particularly high percentage of people employed in manufacturing (3% in 2018, while the Core EU average is 1.9%). Thus, even though the considerable decline there is not particularly important from the perspective of the entire EU, it is crucial for the country.

Conclusions

In the EU, manufacturing and high-tech manufacturing GVA have continuously increased, while employment has decreased since 2000. The new member states, the post-socialist countries, and the Visegrád countries, in particular, experience a GVA growth greater than the Core EU countries in both manufacturing and high-tech manufacturing, and their employment growth is also positive. The PS9 and V4 countries, therefore, have increased their share of manufacturing and high-tech manufacturing GVA and employment shares within the EU. By 2018, the Core EU countries were still 3.1 (2.6) times as productive in manufacturing and 3.5 (2.9) times as productive in the high-tech industries as the PS9 (V4) countries.

In the pharmaceutical industry, the GVA share has increased in the Core EU countries, but it is stagnant in the PS9 and V4 countries, while employment share has increased in each country group. In the Core EU, GVA and employment in the pharmaceutical industry both grew, and combined with continuing labor productivity growth, we could consider the growth intensive. On the other hand, in the PS9 and V4 countries, growth is more extensive. GVA increased because more people work, but efficiency – at least from 2010 on – hardly changed at all. Based on this, the pharmaceutical industry of the PS9 and V4 countries seems to be lagging behind rather than catching up with the pharmaceutical industry of the Core EU's – where this subsection already represents a greater weight both in manufacturing GVA and employment – which is rapidly improving in its efficiency. Consequently, improving labor productivity does not seem to pull up the pharmaceutical industry of the new member countries.

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Restrukturyzacja europejskiego przemysłu farmaceutycznego w latach 2000–2018

Aby sprostać wymaganiom globalnej konkurencji, Unia Europejska (UE) kładzie szczególny nacisk na rozwój opartych na wiedzy, innowacyjnych branż. Przemysł farmaceutyczny, jako dział produkcji zaawansowanych technologii, ma w Europie długą tradycję. Jednak rozkład zatrudnienia i wartości dodanej w przemyśle farmaceutycznym nie jest równomierny w obrębie Unii, a jego rozwój w czasie jest również zróżnicowany. W niniejszym artykule dokonano analizy zmian struktury przemysłu farmaceutycznego w Unii Europejskiej w oparciu o grupy państw. Porównano rozwój zatrudnienia w branży farmaceutycznej w latach 2000–2018 w trzech grupach państw. Użyto prostej metody dekompozycji, aby oddzielić wpływ wzrostu sektora i zmiany wydajności pracy na zmiany zatrudnienia w przemyśle farmaceutycznym, aby dowiedzieć się, do jakiego stopnia podobnie ewoluowała ta branża w różnych grupach państw. Z analizy wynika, że o ile w 12 państwach będących członkami UE przed 2004 r. (Core EU) zatrudnienie nieznacznie wzrosło jednocześnie ze znacznym wzrostem wartości dodanej, to dziewięć państw postsocjalistycznych (PS9) osiągnęło łącznie nieco większy wzrost wartości dodanej przy znacznym wzroście zatrudnienia. W międzyczasie cztery państwa Grupy Wyszehradzkiej (V4) osiągnęły wzrost wartości dodanej podobny do PS9, ale jeszcze większy wzrost zatrudnienia. Wskazuje to na koncentrację części przemysłu farmaceutycznego o wyższej produktywności pracy w państwach Core UE, podczas gdy w słabiej rozwiniętych państwach postsocjalistycznych rozwija się część przemysłu farmaceutycznego o niższej wydajności pracy.

Słowa kluczowe: przemysł farmaceutyczny, wydajność pracy, wzrost, państwa Grupy Wyszehradzkiej

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A Comparative Analysis of the Trade and Industrial Policies of Ukraine and China in the Context of the Obor Initiative

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Abstract

The world economy is evolving towards multipolar globalization, and China has become a new pole of economic development. Ukraine, like other countries, is looking for ways to cooperate with China in the field of trade and investment. China, for its part, offers a model of cooperation within the framework of the OBOR (One Belt, One Road) initiative. Along with Chinese investment in transport and logistics infrastructure, OBOR aims to conclude FTAs with the countries participating in the initiative; thus, the article focuses on the issues of trade, and Ukraine's industrial and innovation policy in the context of the OBOR initiative. A comparative analysis of both countries' trade and industrial policies was conducted to provide a basis for evaluation. The terms of trade between Ukraine and China are not symmetrical due to the difference in the scale of the economy and trade. Additionally, Ukraine's trade regime is relatively

liberal, while the Chinese market is protected by higher tariff and non-tariff barriers. Furthermore, the current situation in mutual trade is asymmetric. Ukraine exports mainly raw materials to China, while exports from China to Ukraine are dominated by investment and consumer goods.
The import dependence of the Ukrainian economy, in general, is high without any noticeable signs of decline. In 2014–2018, the share of imports of goods and services in GDP in Ukraine averaged 54% (for comparison, in China, this parameter was 19%). In 2018, 55% of Ukraine's negative balance in trade in goods was due to trade with China. China seeks to conclude FTAs under the OBOR initiative, but in the current context, the liberalization of trade regimes with China will result in Ukraine growing its raw material exports to China and increasing its dependence on Chinese imports. On the other hand, China's investment, production, research, and technological opportunities can become an important resource for Ukraine to modernize its economy. Promising areas of Chinese investment include high technology, in particular, aviation, shipbuilding, bioengineering, the development of new materials, and more. Ukraine is interested in China's experience in implementing a number of state programs in the field of innovation development of Chinese industrial enterprises. The support system for clusters, industrial parks, Free Economic Zones (FEZs), and technology parks can be recommended for introduction into Ukrainian legislation in the sphere of developing an innovation structure in Ukraine.

Keywords: One Belt One Road initiative, China, Ukraine, trade policy, FTA, industrial policy, innovation policy

JEL: F13, F21, O38, O57

Introduction

Multipolar globalization has become the main direction of world economic development. In the world market, several competing economic poles have evolved, which generate the largest flows of exports and imports of goods and services. At the same time, small economies are becoming more open and are grouped around economic poles into regional blocs. These processes require empirical research, theoretical understanding, and the development of rational trade policy. One of the modern economic poles is the People's Republic of China, and the current model of its regional cooperation is the One Belt, One Road (OBOR) initiative.

On the other hand, with China becoming the world's leading economy, many countries are looking for ways to cooperate profitably with China in trade and investment. China is proposing a model for such cooperation from its side as part of its OBOR initiative. Research on the prospects of EU participation in the OBOR initiative is being conducted in EU countries, in particular, in Poland (Bieliński, Markiewicz, and Oziewicz 2019, pp. 7–22; Chorość-Mrozowska 2019, pp. 39–53). Research in this field is also important for Ukraine, as there is still great potential for economic relations between Ukraine and China. In 2017, Ukraine and China signed a "road map" for the imple-

mentation of the Great Silk Road Economic Belt initiative (North Line *B* of the OBOR initiative, Beijing – Russia – Germany – Northern Europe). However, this document has not yet given impulse to the development of trade between China and Ukraine, nor to Ukraine's involvement in Eurasian logistics for the transportation of goods between China and the EU, or to cooperation in the field of industrial production.

Due to the complication of trade relations with the Russian Federation, Ukraine's participation in the development of the Economic Belt of the Great Silk Road, in general, is quite problematic. Instead, progress is possible in the development of Ukraine's trade with China and the attraction of Chinese investment to Ukraine.

The purpose of the paper is to determine the prospects and ways for Ukraine to join the Chinese government's OBOR initiative in the field of bilateral trade and Chinese investment in Ukrainian industry. It should be mentioned that OBOR will consist not only of a network of ports, roads, railways, airports, power plants, oil and gas pipelines, and refineries, but also free trade areas. A boost to mutual trade would be possible if an FTA between Ukraine and China were established, but the liberalization of trade between Ukraine and China carries many risks in addition to potential benefits, as it could increase Ukraine's raw material exports and increase its dependence on Chinese imports. The development of mutual trade between Ukraine and China is already creating challenges for the domestic economy, given that more than half of the negative balance in Ukraine's trade in goods is caused by trade with China (55% in 2018).

Despite the danger of the further deterioration of the trade balance, the Ukrainian side initiated the launch of consultations on the Ukrainian-Chinese Free Trade Agreement (FTA). A comparative analysis of Ukraine and China's trade policies is an essential step to assess the development potential of Ukrainian exports to China and the risks of increasing Ukraine's domestic market dependence on Chinese imports. This analysis will provide arguments to prove the research hypothesis that there is no evidence of the benefits of concluding an FTA with China, although it should be noted that Ukraine's refusal to launch FTA negotiations with China would not mean refusing to participate in the OBOR initiative itself. As import duties are relatively low in most commodity markets around the world, the main trade barriers are transport costs and non-tariff measures, which the OBOR initiative aims to overcome. In particular, according to the WTO, China has allocated 1 billion US dollars to this organization to implement Trade Facilitation Agreements (TFAs) for developing countries (WTO 2018a). In Ukraine, the TFA implementation process started in 2015, which will definitely contribute to the implementation of the OBOR initiative. In addition, even if Ukraine does not follow through with the negotiations on FTA with China, it will not create barriers to attracting Chinese investment to Ukraine. There is a great demand for foreign direct investment in Ukraine, including investment from East Asia. In our opinion, in the context of the OBOR initiative, the Chinese side will also benefit from investing in the Ukrainian economy given its proximity to the EU, developed transport infrastructure, and high transit potential.

A comparative analysis of Ukraine and China's industrial policies makes it possible to identify existing opportunities and assess the prospects for attracting Chinese investment in Ukrainian industry. Currently, several agreements on the implementation of various sectoral innovation programs have been concluded, including a Joint Declaration on the Establishment and Development of Strategic Partnership Relations between Ukraine and China (2011), an Agreement between the Government of Ukraine and the Government of the People's Republic of China on Technical and Economic Cooperation (2015), a Strategic Cooperation Agreement between Motor Sich Joint-Stock Company, Ivchenko-Progress State Enterprise, and the Chinese Aviation Corporation AVIC International Holding Corporation (2013), and an Agreement on Cooperation in the Fields of Energy Efficiency, Energy Saving and Renewable Energy Sources between the State Agency for Energy Efficiency and Energy Saving of Ukraine and the Chinese Export Credit Corporation (SINOSURE 2013).

In accordance with the outlined problems and the purpose of the paper, the detailed research tasks are as follows: (1) to conduct an analysis of trade development and a comparative analysis of the trade policy of China and Ukraine and verify the research hypothesis that there is no evidence of the benefits of an FTA with China; (2) to conduct a comparative analysis of import substitution policy in Ukraine and China; (3) to identify the specifics of China and Ukraine's industrial policy and areas for attracting Chinese investment to Ukraine's industry; and (4) to compare innovation policy in China and Ukraine to develop recommendations for to stimulate modern forms of innovation infrastructure in Ukraine and promote Chinese investment in innovation activities.

Methods and sources

The study used methods of comparative analysis – to compare the trade, industrial, and innovation policies of Ukraine and China; system thinking – to identify and justify the priority areas for attracting Chinese investment in Ukrainian industry; to reveal risks and positive aspects of development, to define special features of innovation activity in China and Ukraine; methods of statistical analysis (time series, grouping, etc.) – to assess the level of import dependence of Ukraine and China, to estimate the basic indicators of innovation activity in both countries and in the study of bilateral trade flows.

Official data and information sources, academic and analytical papers were used for the research. The analysis of China's non-tariff regulation is based on China's trade policy reports prepared in 2018 by the WTO Secretariat (WTO 2018b) and the Government of China (WTO 2018c). Data from the UN Comtrade Database were used in the study of trade flows, while data from the World Bank and the State Statistics Service of Ukraine were used for the comparative analysis of the level of import dependence of Ukraine and China. Academic and analytical studies of China's strategy

in negotiations on the FTA, and the consequences of trade liberalization with China for other countries, were used along with an empirical approach to verify the working hypothesis that there are no benefits for Ukraine from the FTA with China.

China's trade policy and the question of the feasibility of a China-Ukraine FTA

Between 2013 and 2018, Ukrainian exports of goods to China decreased by 19.3%, while imports during the same period decreased by 3.7% (Figure 1). The decrease in Ukraine's trade with China could be explained by the economic crisis in Ukraine, which started in 2014. While imports of goods to Ukraine from China have almost recovered since the beginning of the crisis, exports are growing at a slow pace.

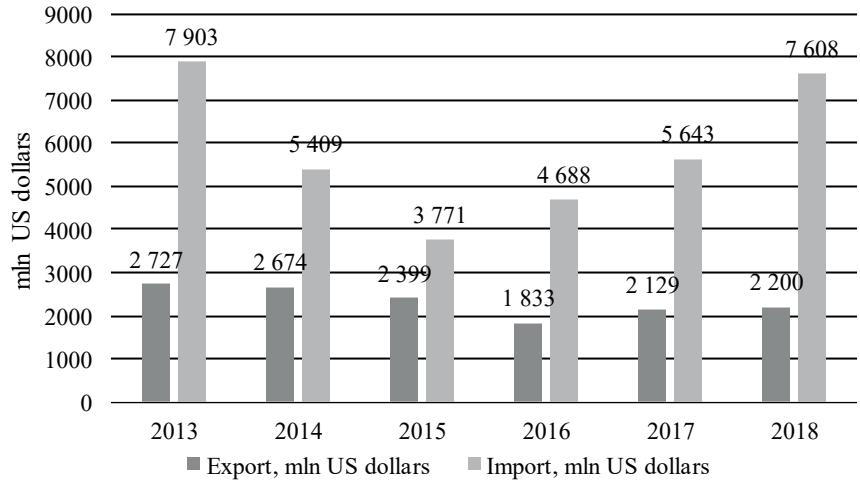

Figure 1. Ukraine's foreign trade in goods with China, 2013–2018, US dollars (millions)
Source: UN Comtrade Data Base.

The structure of Ukrainian exports of goods to China is dominated by raw materials, namely, three commodity groups – metals, grains, and oils, which together account for 74.1% of Ukrainian commodity exports to China. Agricultural exports have the best prospects (Ostashko and Olefir 2019, pp. 124–152). The supply of food to China is one of the main benefits that China plans to gain from the OBOR initiative.

The terms of trade between Ukraine and China have not been symmetrical from the very beginning due to the difference in the scale of the economy and trade. In addition, Ukraine's economy is more open than China's. The average bound tariff (the level at which countries agreed to "bind" their tariffs according to the schedule of tariff reductions upon WTO accession) is 5.9% for Ukraine and 10% for China. This means

that today, when both countries have already fulfilled their obligations to reduce tariffs, the level of tariff protection in China is much higher than in Ukraine. Therefore, it could be concluded that mutual liberalization of tariff regimes is beneficial for Ukraine; however, all benefits of China's tariff liberalization could be eliminated by special features of China's non-tariff customs regulation.

The state plays a key role in the procedures that must be undertaken while entering the Chinese market, so interstate trade agreements benefit launching and developing trade with China. All importers must register as foreign trade operators with the Ministry of Commerce of the People's Republic of China (MOFCOM) or its authorized bodies. China classifies imports into three categories: non-restricted imports, restricted imports, and prohibited imports.

It should be mentioned separately that China is not obliged to lift the ban on importing certain goods in the framework of WTO accession. Thus, the Protocol on China's Accession to the WTO (WTO 2001a) only mentions China's obligation to publish the list of all goods and technologies whose import or export is restricted or prohibited in a regular official publication (Section 8 (a) of the mentioned Protocol). The lifting of bans and the rejection of imposing of new bans on importing certain goods are also not mentioned in the Report of the Working Party on China's Accession to the WTO (Section 8 "Quantitative Restrictions on Imports Including Prohibitions and Quotas") (WTO 2001b, pp. 23–26).

In 2004, China passed a new Law on Foreign Trade (MOFCOM 2004) that significantly expands the list of goods that may be subjected to import restrictions and bans. Article 16 of this Law stipulates that the state may restrict or prohibit the import of certain goods and technologies in order to protect growth or stimulate the creation of a particular domestic industry, as well as restrict the import of agricultural goods. Therefore, prospects for the development of Ukrainian agricultural exports in the case of concluding an FTA with China are far from clear and will be constantly threatened by the introduction of bans by the Chinese government.

While the Chinese government is actively pursuing a policy of trade protectionism to protect its own producers and promote the development of certain industries, international experts believe that China is violating the commitments made in the framework of WTO accession (AEGIS EUROPE 2016). Such violations include, in particular, the adoption of the Plan for Innovative Development of High-Tech Industries, the so-called new strategic industries, and the non-fulfillment of obligations to implement international standards. China continues to develop its own unique national standards to protect its companies from international competition. This policy of China is called "innovation mercantilism" (Ezell and Atkinson 2015).

While evaluating the expediency of concluding an FTA with China, it is important to analyze the specifics of the FTA negotiations by the Chinese side. As of March 2019, China has signed and implemented 16 free trade agreements; these FTAs are more diverse than regional agreements signed by the EU or US. Thus, US regional agreements typically offer accelerated tariff elimination bilaterally in exchange for what

is actually unilateral liberalization of services by the second party. EU agreements emphasize the harmonization of the institutional environment and market competition regulation. Unlike the US and the EU, Chinese agreements are based on diverse approaches to trade liberalization. China is adamant about opening up agricultural markets due to lobbying for its own producers and food security considerations. Its desire to maintain a high level of protection of food markets for food security reasons is considered the most serious obstacle to the progress of FTA negotiations with China. This actually eliminates the advantages of implementing an FTA between Ukraine and China because Ukraine's agricultural sector can become almost the only beneficiary of this FTA.

There are also problems related to translation, especially in periods of aggravation of the negotiation process and the tough position of the Chinese side in negotiations on services, investment, and public procurement agreements (Lingling 2013, pp. 672–696). The seriousness of translation problems in trade relations with China is also noted by researchers from the Foundation for Innovative Technologies and Innovations from the United States, who study China's fulfillment of its obligations to the WTO (Ezell and Atkinson 2015, p. 3). It was even suggested to increase funding for the translation of China's strategic documents, especially those related to the development plans of China's so-called seven strategic and new industries, because, despite its commitments, China does not provide timely notifications to the WTO. It is also noted that China still does not report all new or revised standards, technical regulations, or conformity assessment procedures, as required by WTO rules.

Therefore, in the case of negotiations on the FTA between China and Ukraine, their complex nature and the intransigence of the Chinese to open their agricultural markets should be considered. In addition, even if the Ukrainian side manages to improve its access to the Chinese agricultural market, there is a danger that these markets could be closed at any time because, as mentioned above, according to Article 16 of the Law on Foreign Trade of China, the importing of animal, plant, and fishery products may be restricted if circumstances so require.

Furthermore, in FTA negotiations with countries that export agricultural goods, the Chinese agree to establish tariff quotas on imports of agricultural products. In particular, tariff quotas on agricultural imports into China are set in the FTA with Australia and New Zealand. In FTAs with other countries, agricultural products are generally excluded from the liberalization regime; for example, in the FTA between China and Georgia (2018), durum wheat, soybeans, corn, sugar, and milk powder are excluded from the free trade regime (WTO 2018b, p. 35). Thus, the size of zero-tariff quotas for agricultural exports will be the core issue in the FTA negotiations between Ukraine and China.

Another feature of China's FTAs with agricultural exporters is that they contain a section on special agricultural safeguards. Such sections were included in the FTA with Australia (Article 2.14 of the Agreement) (MOFCOM 2015) and with New Zealand (Article 13 of the Agreement) (MOFCOM 2008). These sections allow China to impose

an additional protective tariff on imports of agricultural products if the volume of imports or the price of imported goods threatens its domestic market. In particular, in the FTA with Australia, special agricultural safeguards protect China's beef and dairy markets, which are not subjected to tariff quotas. It is obvious that the symmetrical measures that the Ukrainian side can defend in the negotiations may be the introduction of a protective mechanism in certain markets for light industry goods.

Comparative analysis of the domestic market protection policy and import substitution in China and Ukraine

The policy of domestic market protection and import substitution should take into account the parameters of the national economy, its dynamics, and structure. Ukraine's economy today can be considered small and open, while China's economy is large and closed. Ukraine's economy has been stagnant for the past ten years, while China's economy has been growing and developing rapidly. The dynamics and structure of the economies of both countries determine the dynamics and structure of their import flows.

Imports of goods to Ukraine between 2014 and 2018 increased from 54 to 57 billion US dollars, or by 5%. During the same period, imports of goods to China increased from 1959 to 2135 billion US dollars, or by 9%. Imports of goods to China have generally been growing faster since 2000, reflecting the faster development of the Chinese economy compared to Ukraine's.

The structure of imports is closely linked to the structure of the economy. China successfully modernized and diversified its economy during the 1990s and 2000s, while Ukraine's economy went going through processes of deindustrialization and narrowing of the range of export products. In 2014–2018, consumer goods dominated the structure of imports to Ukraine, with an average share of 42.1%, and raw materials had the lowest share (11.9% on average). By contrast, in China, capital goods and raw materials were responsible for the largest share of imports (40.1% and 25.0%, respectively), while consumer goods had the smallest share (13.1%).

The Ukrainian economy is more dependent on imports than the Chinese economy. In 2014–2018, Ukraine's share of imports of goods and services in GDP was equal to 53.8%, while for China, this figure was 18.7%. The dependence of Ukraine's economy on imports does not show a decreasing trend. While in 2013 the share of imports in GDP was 51.1%, in 2017, it increased to 55.7%. The Ukrainian economy's dependence on imports has been high since 2000; it has fallen below 50% only three times (in 2006, 2009, and 2010).

China became a full-fledged member of the WTO in December 2001, while Ukraine joined in May 2008. Between 2014 and 2018, China had higher levels of tariff and non-tariff protection of its domestic market than Ukraine (Table 1). The Effectively Applied Weighted Average Tariff in 2018 in China was 3.39%, and 1.56% in Ukraine.

Table 1. Levels of tariff and non-tariff protection of Ukraine and China, 2014–2018

Indicator	Ukraine	China
Simple Average Tariff, %	2.30	7.56
incl. Raw materials	3.81	5.46
Capital goods	1.06	5.27
Intermediate goods	1.39	6.18
Consumer goods	3.52	10.29
Maximum Rate, %	50	695
incl. Raw materials	20	65
Capital goods	20	45
Intermediate goods	50	65
Consumer goods	50	695
Duty-free Tariff Lines Share, %	62.39	25.84
No. of Non-Tariff Measures Affected Products (HS 6 Digit) (2013)	23	81

Source: World Integrated Trade Solution.

The trade policy in Ukraine and China is based on similar principles, targeted at providing the maximum support to the development of domestic production. In particular, imports of raw materials and capital goods are subjected to minimum tariffs, while imports of consumer goods are subjected to maximum tariffs. In particular, the Effectively Applied Weighted Average Tariff in 2018 for raw materials in Ukraine was 0.97% (1.21% in China), for capital goods, it was 0.94 and 2.54, respectively; for intermediate goods – 1.07 and 3.17; for consumer goods – 2.36 and 10.22 (World Integrated Trade Solution n.d.). The difference was that the maximum tariff rate (for consumer goods) in Ukraine was 2.5 times higher than the minimum tariff rate, and in China, it was 8.4 times higher.

The policy of import substitution in Ukraine was implemented with an emphasis on individual industries or through the development of complex programs. In the framework of import substitution policy, localization requirements were also applied to foreign direct investors. According to the Law of Ukraine "On the Development of the Automobile Industry of Ukraine" of March 18, 2004 № 1624-IV, which came into force on June 1, 2004, import duty rates on cars imported to Ukraine were increased.

In September 2011, the Cabinet of Ministers of Ukraine approved the State Program for the Development of Domestic Production, developed for 2012–2018. The program provided for the use of non-tariff technical, sanitary, and phytosanitary measures, certification and standardization, licensing, and quotas to protect domestic producers. The construction of a plant to produce nuclear fuel for the purpose of import substitution of relevant products (with the use of foreign investments) in Smolin, in the Kirovohrad region, was one of the measures included in the program.

Chinese companies implemented import substitution measures both with and without the involvement of Western capital. At the time of Huawei's establishment (1987), China imported all telecommunications equipment. The company refused to enter into

joint ventures with Western transnational corporations, relying on its own research facilities, while actively using reverse engineering, i.e., studying the design of equipment of Western transnational corporations. At the same time, the company received state support because its products were significant for national defense (Huawei n.d.). China's domestic car market demand is now almost entirely satisfied by domestic production, with imports accounting for 9–10% of sales, although back in 1993–1994, the market was divided equally between imports and domestic production. Ninety percent of cars produced in China are provided by joint ventures with foreign manufacturers, such as Volkswagen, Toyota, Peugeot, Citroen, Honda, Renault, Nissan, and BMW (*Industry of China* n.d.).

In order to implement import substitution, China has actively used the requirements of localization of production. In 2005, China launched a program to manufacture wind turbines with the condition that at least 70% of components will be purchased using budget costs in China. This was later rejected due to protests from foreign suppliers, who pointed out that the document contradicted China's commitments to the WTO. However, by that time, the localization rate for local and foreign firms had already reached 70% (Studwell 2017, pp. 316–317). As part of China's five-year development plan for 2016–2020, a "Made in China 2025" plan was developed to increase the share of local raw materials in production to 40% in 2020 and to 70% in 2025 (*Made in China 2025* 2015).

In 2014–2018, relatively large amounts of engines for aircraft and propellers produced by Ukrainian company Motor Sich were imported to China. For the purpose of import substitution, the Chinese side agreed with Motor Sich on joint production in Chongqing Municipality (*China and Motor Sich…* 2017), but in 2019, Skyrizon Aircraft and Xinwei Technology Group bought more than half of the shares from Motor Sich JSC. Today the agreement is being reviewed by the Antimonopoly Committee of Ukraine (*Boguslaev confirmed the sale…* 2019). This agreement is unfavorable for Ukraine, as there is a high probability that production (at least equal to the volume of Chinese imports) will be moved to a plant in China.

Attracting China's investment to Ukrainian industry

Awareness about the real difficulties of Ukraine's economic development, reflected in the slowdown in economic growth and the aging of fixed capital, puts on the agenda the problem of further developing Ukrainian industry in the framework of open markets. In this context, China's experience is important for Ukraine.

The creation of new industries and building industries that had significant export potential almost from scratch (automotive, electronics, etc.) was an important feature of China's industrial policy. The emphasis was on domestic production, not on production from imported components, screwdriver assembly, etc. The main purpose of attracting foreign investment was to obtain modern technologies. This industrial

policy has enabled China to reach a new level of industrial development. In particular, in the already mentioned program "Made in China 2025", published in 2015, the Chinese government outlined the priorities of modernizing Chinese industry based on modern technologies. The main goal of China's comprehensive and ambitious industrial policy is to make the country a world manufacturing power and a high-tech superpower.

Unlike the Chinese Industry Modernization Program, which aims to transition to "smart" industry, the Ukrainian Industry Development Strategy is much more modest and aims to find ways to address key issues, including modernization and growth of industrial production; regional development of industry, and increase its resource efficiency.

Projects targeted at developing the production of goods with high value added, include space and aviation, machine-building products; energy-saving and vehicles using alternative energy sources; new materials; high-tech medical equipment, should become the priority areas for attracting Chinese investment to Ukrainian industry.

Attracting Chinese investment to the space industry is promising for both Ukraine and China, as Ukraine already has all the components of a space industry – science, technology, production, and human resources – to implement full-scale space projects. On the other hand, China is catching up with the United States in many areas, including the space sector. Recently, China announced a plan for a piloted moon landing and operating reusable rocket launchers. Although the industry is 15 years behind, China is looking to the future with confidence (*China seeks leadership…* 2018).

In the last decade, *Ukrainian aircraft construction* has not developed effectively, which has led to a loss of position in the world market. The breaking of the Ukrainian aviation industry's ties with Russia prompted Ukraine's aircraft companies to make profound structural changes and seek ways to attract investment in aircraft construction from other countries, including Europe and East and Southeast Asia. In this context, Ukraine's participation in the OBOR initiative looks promising. For Ukraine, this is, first of all, an opportunity to attract additional investment resources to the aviation industry and enter the markets of East and South-East Asia. In addition, China is interested in expanding investment activities in Ukrainian aircraft production.[1] In particular, China is showing interest in joint production of aircraft engines with the State Concern Ukroboronprom.

The machinery construction industry of Ukraine incorporates more than 20 specialized branches, i.e., practically all categories of mechanical engineering. To increase the efficiency of the enterprises of Ukraine's machinery construction industry within the framework of the OBOR initiative, there is an opportunity to attract Chinese investors, especially to the field of industrial machinery construction. In this case, joint production of the two countries would be a better option. Ukraine, which is going

1 China is studying the possibilities of mass producing a new Ukrainian transport plane, the An–178, with a capacity of up to 18 tons developed by the Antonov State Enterprise (Kyiv) at facilities in China.

through the process of industrialization, could not skip the development of domestic modern engineering. At the same time, Ukrainian enterprises have a rich raw material base for their development, starting with ore and ending with super hard materials. Attracting investment from China will promote the development of innovative and management technologies.

As part of attracting Chinese investment to the production *of energy-saving and alternative energy vehicles*, Ukraine should focus on China's state and private companies to use their experience inside their home country. These can be companies such as Jinko Solar, JA Solar, Trina, Longi, Canadian Solar, Hanwha Q Cells, Risen, Suntech, Astronergy, Telesun (ITC).

Ukraine will benefit from attracting Chinese investors to the *energy-saving and alternative energy vehicle production* sectors in the form of creating new jobs, revenues to state and local budgets, building new energy-efficient industries and related infrastructure across the country, and ultimately positive environmental consequences. For Chinese investors, creating or relocating the production of energy-saving and alternative energy vehicles to Ukraine will allow it to expand the market not only in Ukraine but also in the EU.

Developing and implementing new materials is necessary primarily for the development of mechanical engineering, aerospace, equipment and energy industries, medicine, and more. Therefore, attracting Chinese investment in these areas, in our opinion, will have positive results. However, new prospects will open for Ukraine in the field of producing new materials when it starts to develop modern academic and applied science.

While considering attracting Chinese investment in the production of *high-tech medical equipment*, it should be noted that China has long been known for its in-depth knowledge of the human body and traditional medicine. Their developments are aimed at finding a cure for a variety of diseases, creating specialized apparatus to detect and classify diseases, and creating flexible batteries that run on saline liquids, including sweat or tears.

In our opinion, the innovative potential of Ukraine in producing high-tech medical devices is still estimated to be at a high level, especially if we consider important parameters such as generating new ideas and technologies. Many Ukrainian specialists already work in world research centers. To remain an innovative state, Ukraine needs to develop strong cooperation with China.

However, in attracting Chinese investment in these promising areas of industry, Ukraine must still consider the experience of other countries; and this experience is not always positive. For example, Belarus, having signed an official protocol with the Ministry of Commerce of China in 2014, expected Chinese investors to build new high-tech enterprises. In order to implement the measures provided by the protocol, an industrial park "Big Stone" (80 sq. km), was created with a Chinese corporation's investment of more than 1 billion US dollars over several years, with the total investment sum expected to be 5.5 billion US dollars. Plants and housing were built with

these funds, but the main object of the industrial park was a large logistics center, not high-tech enterprises (Lavnykevych 2018).

In conclusion, it should be noted that attracting Chinese investment to Ukraine could have both benefits (from significant investments) and threats (from targeted changes in investment by investors). Therefore, in deepening bilateral cooperation, Ukraine must clearly understand what priority tasks it can solve at the expense of Chinese investment and what goals a Chinese investor is pursuing in Ukraine.

Cooperation in the field of innovation

The economic development of the country depends on the development of industrial enterprises based on innovations. The effectiveness of the activity is estimated by the innovation indicator, according to which China ranked 14th among 129 countries, while Ukraine was in 47th place (Global innovation index 2019). According to Business dynamism, China took 36th place (Ukraine – 85th), and according to Innovation capability – 24th place (Ukraine – 60th) among 141 countries (*The Global Competitiveness Report 2019*).

China's industrial enterprises produce more than 34% of the world's innovative products, and the Chinese government creates special institutional conditions for their development. This applies not only to the existing legal framework in the field of innovation of enterprises, but also to the development priorities of industries identified in government programs ("Spark", "Torch", "Plan 2020", "Program 863", "Made in China – 2025" and others.

After analyzing state regulations and support for innovation development of industrial enterprises capable of producing competitive products, China's long-term priorities should be understood as supporting the formation of high-tech industries, including the creation of an efficient technology transfer system; providing state support in the creation and development of special forms of organization of innovation (FEZs, clusters, industrial parks, technology parks, etc.) in the provinces of the country that have a network of scientific, technical and industrial enterprises with high scientific and technological potential; using existing scientific and technical potential for the development of priority economic activities (agricultural technologies, biotechnology, nuclear and space technologies, etc.); creating favorable conditions for conducting research in the field of scientific and technical development (chemical technologies and new materials, information technologies, etc.); improving the regulatory framework in the field of development of scientific and innovation activities; integration into the global innovation sphere.

In contrast to China, the Ukrainian processing industry in recent years has been characterized by a decrease in the share of GDP from 20.0% in 2007 to 12.4% in 2017. There has also been a decrease in the number of domestic enterprises in the processing industry to 759 units, of which 680 units are innovation enterprises (production

of food, beverages, and tobacco products; metallurgical production, production of finished metal products, except for the manufacturing of machinery and equipment; the manufacture of machinery and equipment not included in other groups[2]).

Financing the innovation activities of the processing industries was mainly carried out at the expense of own funding (83.5% of the total financing of innovative activity of processing industry of Ukraine). The main reasons for the decline in production include the conflict with the Russian Federation, the loss of industrial potential in eastern Ukraine, and the loss of markets in the post-Soviet space, which were not compensated for by the signing of the Deep and Comprehensive FTA between Ukraine and the EU (2016).

The problem lies in the lack of funding for state programs in the field of innovation. Based on the Chinese experience, the intensification of innovation in Ukraine is possible by creating and developing organizational forms of innovation, among which the most common are FEZs (Shenzhen, Zhuhai, Shantou, Xiamen, Hainan). Clusters are another form of innovation activity of enterprises. Their functioning is supported by the national cluster development program and cluster strategy. Thanks to state support, 150 clusters have been created in China, while in Ukraine, only 50 were created. Ukraine has developed several draft regulation documents on the functioning of clusters, although they remain unapproved.

Industrial parks are one of the most effective organizational forms of innovation activity of industrial enterprises (54 units in China, 43 in Ukraine). In China, industrial parks form about 10.0% of GDP, accumulate 30.0% of foreign direct investment, generate 37% of the country's commodity exports, and employ approximately four million people. Transnational industrial parks generate particular interest, among them, the China-Singapore Suzhou Industrial Park (with an area of 260 km^2, 330 companies, 35,000 employees, and 100 billion US dollars investment), and the Great Stone China-Belarus industrial park (with an area of 112.5 km^2). A favorable investment climate has been created for their functioning, and this climate is guaranteed both by national legislation and by special international agreements and obligations (Egorov, Boiko, and Griga 2015; Boiko 2017, pp. 112–132).

China supports the operation of technology parks in conjunction with Ukrainian enterprises. In particular, in 2011, the Ukrainian-Chinese Techno Park was established in Shanghai (cooperation in the field of marine sciences and technologies, biomedicine, aerospace, major energy sources, etc.) (*Opening ceremony…* 2011), and in 2016, the Chinese-Ukrainian Center for Scientific and Technical Cooperation in Harbin (a platform for scientific cooperation in certain areas, including electric welding).

Ukraine also has a network of 19 technology parks. However, in 2005, some of the most important articles of the laws regulating the activities of technology parks were repealed. Subsequently, the preferences of technology parks in the field of taxation and

2 Information for 2014–2017 is given without taking into account the temporarily occupied territory of the Autonomous Republic of Crimea, the city of Sevastopol and part of the temporarily occupied territories in Donetsk and Luhansk regions.

operating activities were partially restored. To intensify Ukrainian-Chinese cooperation in the field of innovation, it is necessary to create a favorable investment climate to attract Chinese and domestic investors to develop joint industrial enterprises on an innovative basis in priority economic activities.

Conclusions

Based on the results of the analysis in accordance with our four detailed research tasks, a few conclusions can be formulated.

1. A comparative analysis of the trade policy of Ukraine and China and trends in bilateral trade in goods showed that the most likely scenario for mutual trade development would be strengthening the raw material orientation of Ukrainian exports with an emphasis on agricultural goods and the increase in dependence of Ukraine's domestic market on Chinese goods. This scenario works to provide the main benefits that China plans to gain from the implementation of the OBOR initiative, namely, providing raw materials for its own processing industries, providing food for its own population, and promoting Chinese goods to markets around the world.
2. The dependence of Ukraine's economy on imports remains high without any significant signs of decline. This is an unnatural phenomenon given the large population, large territory, and significant production potential. The high level of import dependence resulted from the long-term economic crisis of the 1990s, the policy of trade liberalization, and a number of other factors. The analysis verified our hypothesis that given the high risks of deterioration of Ukraine's trade balance due to trade liberalization with China, the conclusion of an FTA with China at the current stage of Ukraine's development is not appropriate.
3. At this stage of Ukraine's development, it is recommended to limit the potential partnership to concluding a Bilateral Investment Agreement with China, which China should conclude before starting negotiations on the establishment of the FTA. Ukraine's economy needs to intensify domestic production by attracting foreign direct investment and mobilize domestic sources of growth. China successfully followed this path during the 1990s and 2000s, and its experience is important for Ukraine. In the context of this experience, it is rational to deploy innovation and investment cooperation between Ukraine and China, mainly in Ukraine, taking into account its territorial proximity to the EU, developed transport infrastructure, and high transit potential, which is also useful for China in the OBOR initiative. The main areas of attracting Chinese investment in Ukrainian industry are high-tech areas such as aviation, the shipbuilding industry, and the development of new materials.
4. Considering the state of innovative development of industrial enterprises of Ukraine, it is expedient to create clusters in Ukraine with the involvement of Chinese investments within the framework of the OBOR initiative. In addi-

tion, the analysis of China's successful experience in the development of other special forms of organizing innovation proves the importance of developing technology parks, industrial parks, and FEZs. To implement this, it is necessary to make changes in the institutional support for the development of innovation in Ukraine.

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Analiza porównawcza polityki handlowej i przemysłowej Ukrainy i Chin w kontekście inicjatywy OBOR

Gospodarka światowa ewoluuje w kierunku wielobiegunowej globalizacji, a Chiny stały się nowym biegunem rozwoju gospodarczego. Ukraina, podobnie jak inne kraje, szuka sposobów współpracy z Chinami w zakresie handlu i inwestycji. Z kolei Chiny oferują model współpracy w ramach inicjatywy OBOR. Ponieważ oprócz chińskich inwestycji w infrastrukturę transportowo-logistyczną OBOR ma na celu zawarcie umów o wolnym handlu z krajami uczestniczącymi w inicjatywie, artykuł skupia się na zagadnieniach polityki handlowej, przemysłowej i innowacyjnej Ukrainy w kontekście inicjatywy OBOR. Warunki handlu między Ukrainą a Chinami nie są symetryczne ze względu na różnice w wielkości gospodarek i handlu. Warunki handlu na Ukrainie są również dość liberalne, podczas gdy rynek chiński jest chroniony przez wyższe bariery o charakterze taryfowym i pozataryfowym. Obecna sytuacja we wzajemnym handlu ma również charakter asymetryczny. Ukraina eksportuje do Chin głównie surowce, podczas gdy eksport z Chin na Ukrainę jest zdominowany przez dobra inwestycyjne i konsumpcyjne.
Zależność ukraińskiej gospodarki od importu jest duża, bez zauważalnych oznak spadku. W latach 2014–2018 udział importu towarów i usług w PKB na Ukrainie wynosił średnio 54% (dla porównania w Chinach – 19%). 55% ujemnego salda handlu Ukrainy towarami w 2018 roku było wynikiem wymiany handlowej z Chinami. Chiny dążą do zawarcia umów o wolnym handlu w ramach inicjatywy OBOR, ale w obecnej sytuacji liberalizacja handlu z Chinami spowoduje wzrost ukraińskiego eksportu surowców do Chin i zwiększy zależność od chińskiego importu. Z drugiej strony możliwości inwestycyjne, produkcyjne oraz naukowe i technologiczne Chin mogą stać się znaczącym czynnikiem służącym modernizacji gospodarczej Ukrainy. Gałęzie przemysłu wysokich technologii, takie jak lotnictwo, przemysł stoczniowy, bioinżynieria, rozwój nowych materiałów itp., są obiecującymi obszarami przyciągającymi chińskie inwestycje. Interesujące dla Ukrainy są chińskie doświadczenia w realizacji szeregu programów państwowych w zakresie rozwoju innowacji w chińskich przedsiębiorstwach przemysłowych. Wskazane jest wprowadzenie systemu wspierania klastrów, parków przemysłowych, Wolnych Stref Ekonomicznych (WSE) i parków technologicznych do ukraińskiego ustawodawstwa dotyczącego systemu innowacji na Ukrainie.

Słowa kluczowe: Inicjatywa OBOR, Chiny, Ukraina, polityka handlowa, umowy o wolnym handlu, polityka przemysłowa, polityka innowacyjna

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Consumer Behaviour in the Accommodation Services Market – a Comparison of Vienna, Bratislava and Prague in 2018

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Abstract

The paper aims to compare three accommodation services markets using empirical data from more than 250 accommodation facilities in specific destinations (Vienna, Bratislava, Prague). The data are available on a daily basis, but the resulting comparison is then performed on a monthly basis within 2018. The comparison is performed based on three basic criteria – occupancy, average daily rate and an indicator of price elasticity of demand. Price elasticity is measured using a log-log regression analysis. The key findings of the comparison are as follows: (1) The Vienna and Prague markets are similar in terms of occupancy and coefficient of price elasticity. In contrast, the Bratislava market showed statistically significant differences from the other two markets in all the criteria under review. (2) The Bratislava market operates at a significantly lower price range compared to the other markets analysed. In the long term, this market has also been lower in the field of occupancy. (3) The markets in Vienna and Prague respond more dynamically to changes in consumer behaviour by changing prices. (4) The so-called "November Phenomenon" has been identified, where all indicators in all markets behave unconventionally. (5) All markets have in common the fact that they have shown price-inelastic demand over the long term, and at the turn of the year, they all face Giffen's paradox.

Keywords: accommodation service, consumer behaviour, price elasticity, Vienna, Bratislava, Prague

JEL: D12, O14

Introduction

The competitiveness of tourism destinations is one of the critical areas of tourism research (Ivanov and Webster 2013; Dorta-Afonso and Hernández-Martín 2015). For our comparison, we used TTCI (Tourism and Travel Competitiveness Index), which considers four areas of destination evaluation, namely destination infrastructure, national tourism policy setting, natural and cultural resources, as well as the state environment itself. One of the key areas for assessing the competitiveness of destinations is the hotel industry (Ivanov and Ivanova 2016).

If we focus on comparing the hotel market environment, most of the previous studies mainly examined the competitiveness (efficiency comparison) of companies (hotels and restaurants) in a given market. Kim and Kim (2005) confirmed the competitive advantage represented by a strong brand. Akbaba (2006) and Reynolds and Thompson (2007) investigated the impact of customer satisfaction on the overall quality of services. Nunes, Estevao and Nicolau Filipe (2018) use Porter's model to identify the main factors in the field of competitiveness of accommodation providers, including cooperation and innovation, business environment characteristics, and the state of interconnected and supportive industries. Baldassin, Gallo and Mattevi (2015) compared the quality and scope of services provided and the characteristics of destinations for 26 European countries. Xia et al. (2018) used user-created content (reviews and ratings) to compare individual accommodation facilities and assess their competitiveness. Others (Barros 2005; Sanjeev 2007) used economic models to compare accommodation facilities.

One of the widely used methods of economic comparison is the input-output DEA model (Sigala 2004; Wang, Hung, and Shang 2006; Hsieh and Lin 2010). Sanjeev (2007) compared hotels and restaurants based on book values using the values of fixed and total assets, operating costs and equity. The output was then total income and profit before and after taxation. Barros and Dieke (2008) used the total cost and investment cost, which they linked to the RevPAR indicator. Assaf, Barros and Josiassen (2010) examined 78 hotels in Taiwan with a focus on their quantitative characteristics, such as the total number of rooms, the entire staff of each department (booking, food and beverage and aggregated from all other departments) and the main outputs in terms of total accommodation, restaurant and a supplementary income, occupancy and number of customers per employee.

The same method was used by Mendieta-Peñalver et al. (2016), who focused on combining the DEA model and Mediation model. They used a larger number of indicators in the analysis and, in addition to the hotel efficiency indicators (total revenues, RevPAR, labour costs, number of employees, the total number of rooms), they also used the TTCI tourism destination competitiveness indicator and the market share of individual companies. The authors pointed to a close link between the performance of accommodation facilities and their efficiency with the overall performance of tourism destinations and their competitiveness. Other authors point to the close links between the performance of tourism and the hotel industry (Dioko and So 2012; Ivanov and Ivanova 2016).

Most authors emphasise the need to take into account a number of comparative factors, such as the type of customer and their behaviour. Customers' behaviour in relation to the performance of accommodation facilities, i.e. in the sense that it relates to the performance of a tourist destination, is addressed by the authors in the field of revenue management (Vives, Jacob, and Aquiló 2018; Abrate, Nicolau, and Viglia 2019). Sánchez-Pérez, Illescas-Manzano, and Martínez-Puertas (2019) identified the main factors affecting the pricing of accommodation, which include hotel characteristics, electronic word-of-mouth, the level of competition, but also the destination itself.

For customers' behaviour, the most important aspect is their willingness to pay the highest available price set by the accommodation operator. In a dynamic environment, this willingness is expressed in the coefficient of price elasticity of demand, which shows the percentage change in the demanded quantity in relation to the percentage change in the price of a given hotel or destination (Shy 2008; Vives, Jacob, and Aquiló 2018).

The aim of the article is to compare individual markets and identify key differences in consumer behaviour based on the measured coefficient of price elasticity of demand for accommodation services. The comparison itself is based on three criteria: occupancy rate, average price and coefficient of price elasticity of demand. All these criteria are calculated and measured based on market data from nearly 250 accommodation facilities in the individual cities under review. The comparison was carried out monthly during 2018 to better reflect the seasonality that is typical for the accommodation sector.

Methodology

The following part of the article briefly describes the methodological approaches that are used to achieve the main objective of the article, which is aimed at comparing individual markets. However, we will first focus on a brief description of the data used. Given the issue addressed by this paper, it is crucial to have the appropriate data available to interpret the behaviour of individual markets correctly. Long-term cooperation with STR Global Inc., which collects data from hotels in relevant markets, is key to ensuring appropriate data. In this respect, this article can be considered unique because of the fact that the data it contains represent data taken from nearly 250 accommodation facilities from the monitored sites. The uniqueness of these data lies mainly in the fact that it is extracted on a daily basis. In total, there are several thousand pieces of data available, which have been processed in such a way that the outputs can be properly interpreted.

For the comparison itself (which is evaluated based on paired t-tests), three indicators have been chosen that are used in the accommodation sector and which appropriately reflect how consumers make their choices. First of all, we calculate occupancy of individual accommodation capacities, then the average price, and last but not least

(which can be considered another key result of this contribution), we measure the coefficient of price elasticity of demand in the monitored markets.

The occupancy (Occ) indicator is generally used in the analysis of accommodation capacities relatively commonly. Current use can be found, for example, in studies for SMEs – Small and medium-sized enterprises (Nalley, Park, and Bufquin 2019; Tembi and Kimbu 2019). The occupancy calculation itself is given as formula (1).

$$Occ = \frac{total\ rooms\ sold}{total\ rooms\ available\ for\ sale} \times 100\,. \tag{1}$$

The second indicator, which is a criterion for comparison, is the ADR (Average Daily Rate). It is basically an indicator that represents the current average price. It is calculated according to the relation shown below (formula 2)

$$ADR = \frac{total\ rooms\ revenue}{total\ rooms\ sold}\,. \tag{2}$$

Another approach and criterion is the coefficient of price elasticity. Price elasticity is an element of economic theory that combines more advanced analytical tools and classical consumer behaviour based on classical political economy. The first references to the elasticity of demand can be found in Mill. He played an important role in shaping price theory, and he was the one who, in examining the impact of price change on consumer spending, distinguished demand as elastic, inelastic and unit elastic in terms of price. Alfred Marshall, however, made a precise definition of how to quantify the price elasticity of demand. This knowledge could then be used to understand elasticity as an element that helps to understand the behaviour not only of the demand part but of the market as a whole. Current approaches to measuring elasticity include, for example, the approach combining the effect of an Exchange rate with price elasticity (Aalen, Iversen, and Jakobsen 2019) or the approach focused on measuring the so-called cross-price elasticity (Ahn et al. 2018). This article will perform the calculation using a log-log regression analysis. Thus, we will determine the empirical regression function in the form:

$$logQ_i = b_0 + b_1 \times logP_i + e_i\,. \tag{3}$$

The estimation of individual parameters will be performed using the Ordinary least squares (OLS) method. The model used will be applied assuming ceteris paribus, which can be expressed as:

$$if\ \Delta\varepsilon = 0\, than\, \Delta y = \beta_1 \times \Delta x\,. \tag{4}$$

Also, we only address the effect of one component (beta coefficient 1) on the size of component yi, i.e. the value of the quantity demanded. Coefficient β1, or more pre-

cisely, estimated parameter b1, represents the price change. Therefore, the aforementioned restriction is carried out. In addition to the above assumption, the whole model is then handled under the following condition:

$$\sum_{i=1}^{n} e_i^2 = \sum_{i=1}^{n} \left(logQ_i - b_0 - b_1 logQ_i \right)^2 \ldots min \,. \tag{5}$$

It is, therefore, a search for the local extreme of a function, which we call Q, and it looks as follows:

$$Q = \sum_{i=1}^{n} \left(logQ_i - b_0 - b_1 \times logQ_i \right)^2 . \tag{6}$$

The overall solution is, therefore based on the following assumptions (7) and (8):

$$\frac{dQ}{db_0} = 2\sum_{i=1}^{n} \left(logQ_i - b_0 - logP_{1i} \times b_1 \right) \times \left(-1 \right) = 0 \,, \tag{7}$$

$$\frac{dQ}{db_1} = 2\sum_{i=1}^{n} \left(logQ_i - b_0 - logP_{1i} \times b_1 \right) \times \left(-x_i \right) = 0 \,. \tag{8}$$

The model used will be tested at several levels. First, the regression parameters of the model are tested based on the t-test. The quality of the whole regression model is always measured by the coefficient of determination (R2) and thus by the relation:

$$R^2 = \frac{\sum_{j=1}^{n} \left(\widehat{y_j} - \overline{y} \right)^2}{\sum_{j=1}^{n} \left(y_j - \overline{y} \right)^2} . \tag{9}$$

The final price elasticity coefficient of demand is then identical to the value of parameter b1. The results of the calculation of elasticity are presented in Table 1.

Table 1. Coefficient of price elasticity

Epd	Demand
$E_{pd} = \lvert 1 \rvert$	Unit elasticity
$E_{pd} > 0$	Giffen's paradox
$E_{pd} < 0$	Negative price elasticity
$-1 < E_{pd} < 0$	Inelastic demand
$-\infty < E_{pd} < -1$	Elastic demand

Source: own processing.

Results

The analysis carried out focuses on the situation on the market of accommodation services of the capitals of Austria, Slovakia and the Czech Republic. As part of this research, data were collected for 2018 on a monthly basis with a view to better evaluating individual outputs. The monthly basis was chosen mainly because it is more appropriate to show the seasonality of individual markets and thus different consumer behaviour. Any insight into the problem is made from the point of view of consumer behaviour. First, it is the willingness of consumers to provide accommodation services on the basis of measuring the occupancy of individual destinations. Second, it is a comparison based on an average price paid (measured by the Average Daily Rate; ADR). Third, it is a comparison based on the measured price elasticity of demand. Individual outputs are presented in the following text.

In this part of the text, we will focus on comparing the above three markets based on occupancy first. Occupancy of individual destinations as its average monthly value is shown in Table 2. Then, in Table 3, you can see basic descriptive statistics of individual markets.

Table 2. Occupancy (%)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Vienna	52	57	69	81	82	86	80	85	87	86	82	85
Bratislava	54	56	60	72	73	73	62	68	76	73	65	62
Prague	53	59	75	82	85	85	86	90	88	87	76	80

Source: own processing.

Table 3. Basic statistics indicators of occupancy

	Mean	Minimum	Maximum	Std. Dev.
Vienna	77.59	51.70	86.60	11.87
Bratislava	66.15	53.90	75.60	7.35
Prague	78.68	53.00	89.60	11.62

Source: own processing.

The above data show that Bratislava has shown the lowest value in the long term, but we can find the overall minimum value in Vienna. The situation is similar in terms of maximum occupancy rates in individual markets. This also corresponds to the highest value of the standard deviation of Vienna, while the minimum values can be found in the Bratislava market. For ease of reference, occupancy data in individual markets are also shown in the form of Box Plot (Figure 1).

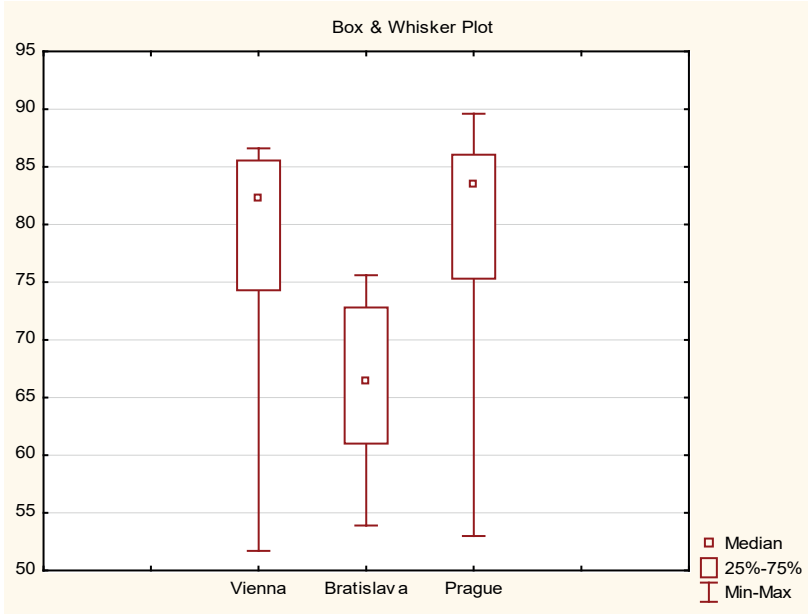

Figure 1. Box Plot of Occupancy
Source: own processing.

The question remains whether these differences in individual markets are statistically significant. Hypothesis testing will be performed to answer this question. After performing the normality test, the two-value-match hypothesis test can be used using a paired t-test based on two independent selections. These paired tests are always performed in triplicate to test the relationship between all three markets. The following hypotheses (where index V denotes Vienna, index B denotes Bratislava, and index P denotes Prague, μ denotes median occupancy) will be tested at the 5% significance level:

H_0: $\mu_V - \mu_B = 0$
H_A: $\mu_V - \mu_B > 0$
H_0: $\mu_V - \mu_P = 0$
H_A: $\mu_V - \mu_P \neq 0$
H_0: $\mu_P - \mu_B = 0$
H_A: $\mu_P - \mu_B > 0$

Below, the outputs of testing individual null and alternative hypotheses will be assessed. First, we focus on the first pair, i.e. comparing the Vienna and Bratislava markets. The established hypotheses are designed to test the claim that the occupancy rate in the Vienna market is higher than in the Bratislava market. Based on the performed test, it is then determined that based on p-value = 0.009567, which is lower than 0.05, we reject the null hypothesis in favour of the alternative hypothesis. It can, therefore, be argued that there was a statistically significant difference in occupancy

rates in the Vienna and Bratislava markets, with the occupancy rate being considered higher in Vienna.

Another comparison took place on the Vienna and Prague markets. At first glance, this market shows very similar results, so the outcome of hypothesis testing will more accurately determine whether these small differences can be considered significant. Alternatively, the hypothesis assumes that there are statistically significant differences (a two-way test). Based on the calculations made and the p-value = 0.8220, it is necessary not to reject the null hypothesis at the 5% level of significance, and it cannot be argued that the occupancy rates in Vienna and Prague are different.

The third comparison will focus on the markets in Prague and Bratislava. Within the hypothesis, we focus on whether the lower occupancy rate in Bratislava is statistically significant compared to the occupancy rate in Prague. Based on the calculations made when p-value = 0.00457, at the 5% level of significance, we reject the null hypothesis, and it can, therefore, be argued that when comparing the market in Prague and Bratislava, the lower occupancy on the Bratislava market is statistically understood as significant. Similar testing is also performed using calculated ADR values and the price elasticity of demand. The outputs are presented below.

This part of the paper focuses on comparisons based on ADR, which we could compare to the average price for accommodation services expressed as its daily value. All numbers are in euros. The following Table 4 and Table 5 represent the aggregated calculated data for each market on a monthly basis.

Table 4. Average Daily Rate (EUR)

Month	1	2	3	4	5	6	7	8	9	10	11	12
Vienna	88	92	88	97	104	106	90	91	117	115	101	125
Bratislava	65	64	65	67	72	70	63	62	72	72	67	69
Prague	73	67	74	95	105	101	92	86	104	99	77	93

Source: own processing.

Table 5. Basic statistics indicators of Average Daily Rate

	Mean	Minimum	Maximum	Std. Dev.
Vienna	101.05	87.50	124.80	12.58
Bratislava	67.34	61.99	71.93	3.56
Prague	88.89	66.91	105.05	13.17

Source: own processing.

If we focus on ADR, it is obvious that the highest levels are achieved in the market in Vienna, then in Prague, and the lowest values can be seen in Bratislava. Interestingly, the market in Bratislava shows a much lower standard deviation than the other two markets, and this refers to the fact that prices in this market are much less dynamic than in the other two markets. For a more straightforward interpretation of the outputs described above, these are also shown in the Box Plot in Figure 2.

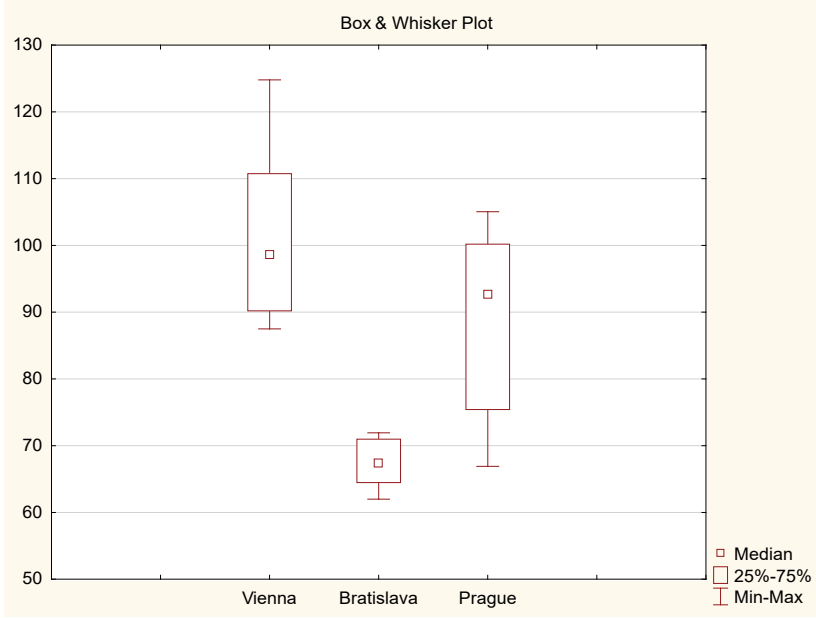

Figure 2. Box Plot of ADR
Source: own processing.

The differences described above are then similarly tested as in the case of occupancy to show the differences between the markets. Again, three pairs of markets are tested in such a way as to obtain comprehensive outputs. Tests (after checking the normality of distributions of a given quantity) run at a 5% significance level and test the following hypotheses (where index V represents data for Vienna, index B data for Bratislava and index P data for Prague; π represents the mean of ADR):

H_0: $\pi_V - \pi_B = 0$
H_A: $\pi_V - \pi_B > 0$
H_0: $\pi_V - \pi_P = 0$
H_A: $\pi_V - \pi_P \neq 0$
H_0: $\pi_P - \pi_B = 0$
H_A: $\pi_P - \pi_B > 0$

Now we will focus on evaluating individual hypotheses. The first pair tested was Vienna and Bratislava. With a p-value = 0.0001, we clearly reject the null hypothesis, and we can confirm that at the 5% significance level, the claim that the ADR in Vienna is higher than the ADR in Bratislava is correct (even with a much higher probability than 95%). The second pair compared was Vienna and Prague. Here, the Box Plot shows that these are similar markets, with Prague reaching basically a lower value. Nevertheless, the hypothesis was established as a two-way test. Based on the calculations performed and a p-value = 0.0305, the null hypothesis in favour of the alternative hypothesis can also be rejected. However, it is obvious that this testing is not as clear

as in the case of the market comparison in Vienna and Bratislava above. The third pair compared was the situation in Prague and Bratislava. Like the comparison of Vienna and Bratislava, there are significant differences in prices, as evidenced by the statistical test. On the basis of the p-value = 0.0001, we reject the null hypothesis in favour of the alternative hypothesis.

The last criterion under consideration in the three markets is the coefficient of price elasticity of demand. This coefficient was determined based on the log-log regression functions – a total of 36 were created. The results of these calculated elasticities are presented in Table 6 and Table 7 below.

Table 6. Coefficients of price elasticity of demand

Month	1	2	3	4	5	6	7	8	9	10	11	12
Vienna	0.4	–0.5	–0.3	–0.5	–0.3	–0.2	–0.1	–0.3	–0.3	–0.3	–1.1	–0.1
Bratislava	–1.2	–0.9	–1.5	–0.1	–0.3	–1.4	–1.5	–0.5	–0.4	–0.1	–1.0	0.2
Prague	0.3	–0.3	–0.3	–0.1	–0.1	–0.5	–0.1	–0.2	–0.1	–0.1	–1.0	0.3

Source: own processing.

Table 7. Basic statistics indicators of the coefficients of price elasticity of demand

	Mean	Minimum	Maximum	Std. Dev.
Vienna	–0.29	–1.10	0.43	0.36
Bratislava	–0.72	–1.51	0.21	0.60
Prague	–0.18	–1.06	0.34	0.36

Source: own processing.

Based on the above figures, it is evident that in all three markets, the so-called Giffen's paradox is identified, in which the value of price elasticity of demand is positive. These non-standard situations are typically present in January and December, i.e. at a period that is always outside traditional values in terms of accommodation services due to the turn of the year. Interestingly, however, is the unequivocal increase in negative elasticity in November in all three markets. This increase also corresponds to the decline in average prices in this period. Based on analysis from other years, it can be argued that this phenomenon occurs regularly in all three markets. To simplify the interpretation of the value, the development is supplemented with a graphical representation, which is presented in Figure 3.

To complete the overview, we also show a Box Plot that presents the whole situation on the three markets monitored in 2018 much better. The output is presented in Figure 4. The numbers in Table 7 also point to the fact that the standard deviation values for the Bratislava market are almost double. This also corresponds to Figure 3.

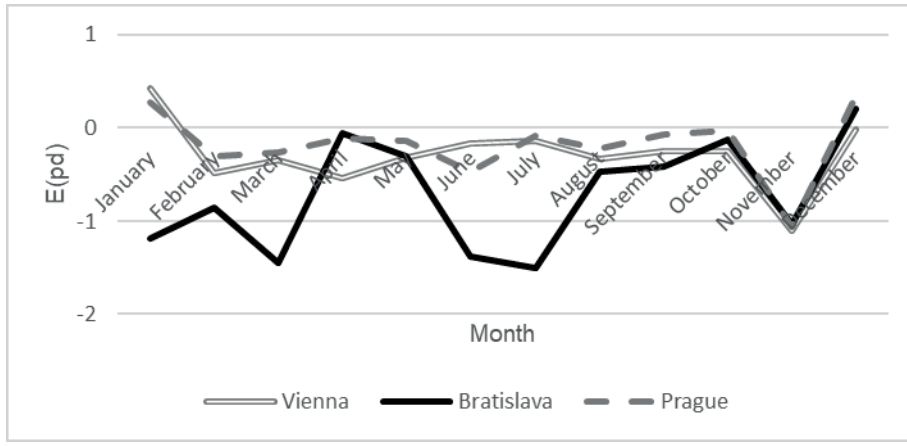

Figure 3. Development of price elasticity
Source: own processing.

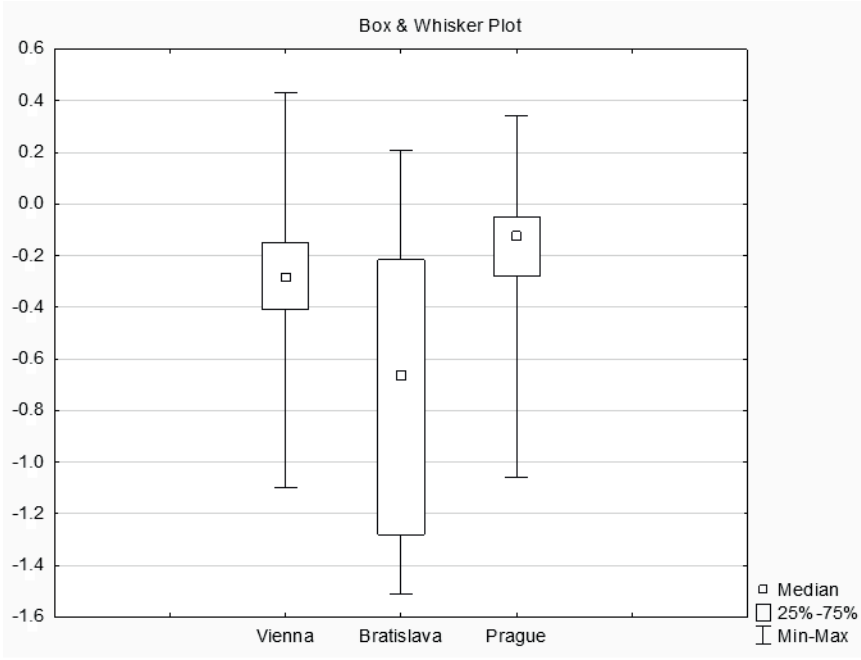

Figure 4. Box Plot of price elasticities
Source: own processing.

As well as with Occupancy and ADR, tests will be carried out to determine if there are statistically significant differences between the markets under review. Based on several studies (Goolsbee and Petrin 2004; Morlotti et al. 2017), it can be assumed that

elasticity also has a normal distribution, and therefore paired t-tests will be performed similarly to the previous cases. New hypotheses will be determined to be tested again (where index V denotes data for Vienna, index B data for Bratislava and index P data for Prague; ρ denotes the mean value of elasticity).

H_0: $\rho_V - \rho_B = 0$
H_A: $\rho_V - \rho_B \neq 0$
H_0: $\rho_V - \rho_P = 0$
H_A: $\rho_V - \rho_P \neq 0$
H_0: $\rho_P - \rho_B = 0$
H_A: $\rho_P - \rho_B \neq 0$

First, the Vienna and Bratislava markets are compared again. Based on the calculated p-value = 0.0455, we reject the null hypothesis, and at the 5% significance level, the differences in elasticity were shown to be significant. However, the p-value does not reach unambiguously low values, and we would not reject the null hypothesis at a lower level of significance. When comparing the Vienna and Prague markets, based on the price elasticity of demand, we get a p-value = 0.4456, and on this basis, we do not reject the null hypothesis. It can be argued that the values of price elasticity in the markets in Prague and Vienna are similar. The conclusion, which is based on the comparison of the Prague and Bratislava markets, is similar to the difference between the Vienna and Bratislava markets. The result of the p-value = 0.0136 leads to the rejection of the null hypothesis and to the claim that the price elasticities of the two markets are different.

Conclusion

It can be argued that the comparison of occupancy of individual markets holds true that the Vienna and Bratislava markets show demonstrable differences, as well as the market pair Prague and Bratislava. On the other hand, a comparison of the Vienna and Prague markets shows that the occupancy differences have not been established and it can, therefore, be argued that these markets function similarly in terms of occupancy.

The second criterion tested was ADR, which is basically an average price. Based on the tests carried out, it has been shown that the price differs between all pairs, and thus it can be argued that the price is different across the markets examined. However, this conclusion does not indicate that these markets operate differently. Rather, it points to different price levels in economies in general. A more detailed description of the price differences is described later in this chapter.

The third test criterion was the calculated value of price elasticity of demand – it shows here that the same fact applies as in case of occupancy. Between the Vienna and Bratislava markets, as well as between Prague and Bratislava, there were statistically significant differences in the mean elasticity values. By contrast, in the

pair of Vienna and Prague, the null hypothesis of the same functioning of the market was not rejected, and it can, therefore, be argued that in terms of price elasticity, these markets (or consumers) are very similar in behaviour.

On the basis of the analysis carried out, other conclusions that follow from the research are observable. For example, it is clear that Bratislava works with a much lower price range than other markets. If the range is larger in other markets, it means that businesses are more proactive in the price there, probably to increase their sales. Thanks to such a dynamic approach to price changes, the value of the coefficient of price elasticity is also relatively stable or rather more stable than on the Bratislava market. It can be argued that accommodation capacities in the Prague and Vienna markets respond more dynamically to consumer behaviour and thus do not result in such marked differences in changes in price elasticity of demand. Bratislava, as the only market surveyed, has also not reached occupancy levels as high as other markets in the long term. Again, this can only be a consequence of the aforementioned.

The research also points to the occurrence of a certain "November phenomenon", which describes the fact that the price elasticity of demand will change significantly in November, as will the average price and occupancy. This phenomenon has also been observed in previous years.

It is also necessary to mention what the three markets have in common. According to research, it can be argued that all three markets are associated with price inelastic demand for accommodation services. Although in some cases the coefficients fall into positive values or higher negative values, this is true from the point of view of mean values. In all three markets, we also observe Giffen's paradox of consumer behaviour, which is always reflected at the turn of the year.

All the above conclusions are presented on market data in the accommodation sector in three different destinations. These outputs can serve as an additional basis for examining such a wide-ranging problem as consumer behaviour in the markets, and they can also serve as a basis for companies to make use of price elasticity coefficients to optimise prices, which can lead to an increase in expected sales.

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Zachowania konsumentów na rynku usług noclegowych – porównanie Wiednia, Bratysławy i Pragi w 2018 roku

Celem artykułu jest porównanie trzech rynków usług noclegowych przy użyciu danych empirycznych pochodzących z ponad 250 obiektów noclegowych usytuowanych w trzech miejscowościach (Wiedeń, Bratysława, Praga). Na podstawie danych dziennych dokonano ich porównania dla okresów miesięcznych w 2018 roku. Porównania dokonano na podstawie trzech podstawowych kryteriów – obłożenia, średniej stawki dziennej oraz wskaźnika cenowej elastyczności popytu. Elastyczność cen zmierzono za pomocą analizy regresji log-log. Kluczowe wnioski z porównania są następujące: (1) Rynki wiedeński i praski są podobne pod względem obłożenia i współczynnika elastyczności cenowej. Z kolei rynek w Bratysławie wykazywał istotne statystycznie różnice w porównaniu z pozostałymi dwoma rynkami pod względem wszystkich badanych kryteriów. (2) Rynek w Bratysławie działał w znacznie niższym przedziale cenowym w porównaniu z innymi analizowanymi rynkami. W dłuższej perspektywie rynek ten charakteryzował się także mniejszym obłożeniem. (3) Rynki w Wiedniu i Pradze reagowały bardziej dynamicznie zmianą cen na zmiany w zachowaniu konsumentów. (4) Zidentyfikowano tak zwany „efekt listopada", w którym wszystkie wskaźniki na wszystkich rynkach zachowywały się nietypowo. (5) Cechą wspólną wszystkich rynków jest to, że w długim okresie wykazywały one nieelastyczny cenowo popyt, a na przełomie roku wszystkie te kraje zmagały się z paradoksem Giffena.

Słowa kluczowe: usługi noclegowe, zachowania konsumentów, elastyczność cenowa, Wiedeń, Bratysława, Praga

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The Persistence of Suicides in G20 Countries between 1990 and 2017: an SPSM Approach to Three Generations of Unit Root Tests

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Abstract

Suicides represent an encompassing measure of psychological wellbeing, emotional stability as well as life satisfaction, and they have been recently identified by the World Health Organization (WHO) as a major global health concern. The G20 countries represent the powerhouse of global economic governance and hence possess the ability to influence the direction of global suicide rates. In applying the sequential panel selection method (SPSM) to three generations of unit root testing procedures, the study investigates the integration properties of suicides in G20 countries between 1990–2017. The results obtained from all three generations of tests provide rigid evidence of persistence within the suicides for most member states of the G20 countries, hence supporting the current strategic agenda pushed by the WHO in reducing suicides to a target rate of 10 percent. In addition, we further propose that such strategies should emanate from within G20 countries and spread globally thereafter.

Keywords: Suicides, sequential panel selection method (SPSM), nonlinear unit root tests, Fourier form unit root tests, G20 countries

JEL: C22, C32, C51, C52, I12

Introduction

According to the World Health Organisation (WHO) Mortality Database, suicides are classified as one of the leading causes of death worldwide, claiming almost a million lives every year. It has thus risen as an important public health problem and a source of concern for public health management in both developed and developing countries. Suicides, as an extreme form of mortality, encompass a broad base of psychological factors such as mental health, life satisfaction and happiness (Daly et al. 2013), and it has a profound effect not only on public health but also on social and economic spheres. Moreover, death caused by suicide, besides the emotional and psychological effects on the community, also results in a loss of potential labour force participation (Lee, Roser, and Ortiz-Ospina 2017). In 2013, the World Health Organization (WHO) launched its '*Mental Health Plan*' in which member states committed themselves to reducing global suicides by 10 percent by 2020. In 2014, the WHO released its first suicide-focused report titled '*Preventing Suicides: A global imperative*', in which it is recommended that member states adopt and implement national strategies aimed at combating and preventing suicides (World Health Organisation 2014).

Considering the overriding importance of suicides on a global platform, it is curious to know why very little is known and researched about suicides in the empirical economic literature. Firstly, the psychological aspect of human behaviour was earlier thought to be unnecessary for economic analysis since such measures were not backed by observable data (Case and Deaton 2013). Secondly, in many countries, suicides are considered a 'taboo' topic; hence, the collection of adequate data on suicide statistics becomes problematic. A contributing factor to this relates to media reporting on suicides, which has been shown to influence suicide behaviour, as 'careless' media reporting triggers imitation behaviour amongst vulnerable citizens (Chu et al. 2018). Thirdly, studies on suicides have been dominated by psychological sciences, which primarily depend on longitudinal analytical techniques. It is only more recently that academics have considered the use of adequate time series analysis (see Platt 1984; Platt, Micciolo, and Tansella 1992; and Phiri and Mukuku 2020 for a comprehensive review of the empirical literature).

A policy question which demands empirical attention is whether policymakers are currently in control of prevailing levels of suicides globally. Currently, a majority of the economic literature has examined the relationship between suicides and other economic factors such as income (Chuang and Huang 1997; Brainerd 2001; Neumayer 2003), unemployment (Andres 2005; Dahlberg and Lundin 2005; Phiri and Mukuku 2020), or divorce (Chuang and Huang 1997; Neumayer 2003; Andres 2005). Other stud-

ies have even designed a so-called 'natural rate of suicides', a concept which assumes that suicides could never be zero, regardless of how ideal socioeconomic conditions are Yang and Lester (1991; 2009), Viren (1999) and Andres and Halicioglu (2011). Nevertheless, these studies do not address whether suicides will converge back to their 'natural rate' in the face of exogenous shocks to the time series. This is certainly of concern following the global disturbances recently experienced between 2007 and 2010 (i.e. US sub-prime crisis of 2007, global recession period of 2009, the Euro debt crisis of 2010, and the ongoing coronavirus pandemic) which are reportedly believed to have significantly increased global levels of suicides (Chang et al. 2013; Kawohl and Nordt 2020; McIntyre and Lee 2020). With these global shocks, it is important to know whether suicides will revert to their natural equilibrium or continue in disequilibrium until they reach a 'new equilibrium level'.

The purpose of our study is to investigate the integration properties of suicide rates in G20 countries over 1996–2017 as a means of determining whether suicides are stationary or not. As inferred in the earlier works of Nelson and Plosser (1982) and Campbell and Mankiw (1987), if a times series is found to be non-stationary, then the deviation of the series from its natural equilibrium after a shock is without bounds, and the series converges into a different equilibrium. Conversely, a mean-reverting process would imply that shocks to a time series are short-lived, and minimum intervention is required to revert a time series back to its natural equilibrium. Therefore, countries whose suicides evolve as a non-stationary process would require aggressive policy intervention in the face of a shock to the suicides whilst those countries whose suicides are stationary would require less intervention.

To the best of our knowledge, only Chang, Cai, and Chen (2017), Chen, Chang, and Lin (2018) and Akyuz, Karul, and Nazlioglu (2020) have previously attempted to address this policy concern of 'persistence in suicide rates' using appropriate time series econometric techniques albeit restricted towards the US, OECD countries and Turkey, respectively. Our paper extends on these previous works by examining the integration properties of suicides for G20 countries, using the sequential panel selection method (SPSM) of Chortareas and Kapetanois (2009). This innovative method allows us to separate a panel of G20 suicide times series into two sub-panels, the first consisting of stationary series and the second consisting of non-stationary series. Our empirical approach allows us to determine which specific G20 member states require more policy intervention in suicide prevention after a significant shock to suicides. We consider this exercise more pertinent considering the ongoing coronavirus pandemic, which has deteriorated global mental health and contributed to recent spikes in suicides (Kawohl and Nordt 2020; McIntyre and Lee 2020). To ensure the robustness of our empirical analysis, we apply the SPSM to three generations of unit root testing procedures, ranging from traditional linear unit roots to more advanced tests which account for asymmetries and structural breaks in the series.

The remainder of our paper is structured as follows. Section 2 presents the paper's theoretical framework, while the methodology is outlined in section 3 of the paper.

Section 4 of the paper gives a brief overview of suicides in G20 countries. The empirical results are presented in section 5, and the study concludes in section 6 in the form of policy implications and recommendations for future research.

Theoretical framework

Models of suicide within the academic realm have become increasingly sophisticated since the seminal contribution of Durkheim (1897), which is widely recognised as the earliest comprehensive sociological theory of suicide. In Durkheim's model, suicides are primarily driven by two psychological factors: excess 'social integration' and 'social regulation'. Durkheim's argument is that since both economic prosperity and depression result in less social integration and regulation, then suicides will rise during these two extreme periods when compared to periods of normal economic circumstances and hence, suicides are generally considered a 'societal problem'.

Nevertheless, in the early post-Great Depression period of the late 1930s and early 1940s, researchers began to think of suicides in socioeconomic spheres. Henry and Short (1954) proposed a countercyclical theory based on a 'frustration-aggression' approach in which suicides rise during recession and fall during economic booms, with the correlation between suicides and the business cycle being more prominent for 'upper-class citizens'. Similarly, Ginsberg (1966) developed a procyclical theory which states that suicide arises from the dissatisfaction of individuals. This is directly related to the discrepancy between the actual reward of an individual and his/her level of aspiration. He argues that as the economy expands, the prosperous economic environment pushes aspirations up to a rate faster than the rewards and this resulting disparity motivates suicide.

In the mid-1970s, Hamermesh and Soss (1974) provided the first real attempt at using dynamic economic theory to explain suicides as individuals' decisions. In particular, they used the following 'neo-classical type', utility-maximizing framework in which the utility function for the average individual in a group of people with permanent income *YP*:

$$U_m = U[C(m, YP) - K(m)] > 0, \tag{1}$$

where m represents his age and K represents a technological relation describing the cost each period of staying alive at a minimum subsistence level. If this is the utility of the average individual age m with permanent income YP, then the present value of his expected lifetime utility at age a is represented by the following equation:

$$Z(a, YP) = \int_{\alpha}^{\omega} e^{-r(m-a)} U_m P(m) \quad \partial Z/\partial YP > 0, \partial Z/\partial a < 0, \tag{2}$$

where r is the private discount rate, ω is the highest attainable age, and $P(m)$ is the probability of surviving to age m given survival to age a. In defining $b_i \sim N(0, \sigma^2)$ as an individual's preference for living or distaste for committing suicide, then the hypothesis of committing suicides can be given as

$$Z_i(a, YP) + b_i = 0, \tag{3}$$

where equation (3) assumes that an individual commits suicide when the total discounted lifetime utility remaining reaches zero. Notably, whilst the model presented by Hamemesh and Soss (1974) can address certain questions, such as the impact of age and income on suicides, it fails to appropriately address other 'supply-side' policy-related issues, such as how changes in the availability of different suicide methods can affect the agent's choice of when and whether to commit suicide.

The demand and supply model presented by Yeh and Lester (1987) more appropriately addresses these issues. In their model, the demand-side is characterized by a positive relationship between the perceived benefits of suicide, such as alleviating suffering and the probability of committing suicide.

$$p_t^d = \alpha_0 + \alpha_1 E(s_t) \quad \alpha_1 > 0 \tag{4}$$

On the other hand, the supply-side is characterized by a negative relationship between the perceived costs of suicides, such as the painfulness of committing suicide and the probability of committing suicide, i.e.

$$p_t^s = \beta_0 + \beta_1 E(s_t) \quad \beta_1 < 0 \tag{5}$$

By setting $p_t^d = p_t^s$, the equilibrium suicide rate can be expressed as:

$$s_t^* = \pi_0 + \pi_1 E(s_t), \tag{6}$$

where $\pi_0 = (\alpha_0 + \beta_0)/\beta_1$, $\pi_1 = \alpha_1/\beta_1$, $E(s_t) = \nu_0 + \nu_1 s_{-1} + \ldots + \nu_q s_{t-q}$ and e_t is an error term which soaks up any shocks influencing demand-side and supply-side determinants of suicide. In further denoting $^*_0 = \pi_0 + \nu_0$ and $^*_j = \pi_j \nu_j$, for $j = 1, 2, 3, \ldots, q$, the equilibrium suicide rate (s_t^*) can be derived as:

$$s_t^* = {}^*_0 + {}^*_1 s_{t-1} + {}^*_2 s_{t-2} + \ldots + {}^*_q s_{t-q} + e_t \tag{7}$$

Note that equation (7) bears much structural resemblance to a standard unit root test regression, and it is on this foundation that we build our empirical framework.

Methodology

The SPSM approach

When it comes to the testing of unit roots within a time series, the power properties of panel-based unit root testing procedures are well-acknowledged within academic circles, and yet simultaneously, concerns arise, particularly, in dealing with the 'homogeneity of results' produced by panel tests (Maddala and Wu 1999). The SPSM was developed by Chortareas and Kapetanois (2009) as an alternative to conventional panel unit root tests which fail to appropriately deal with the problem of heterogeneities existing with panel series. The authors proposed a procedure in which panel unit root testing procedures are performed sequentially on a reducing panel set of data, and in each sequence, the individual series with the highest rejection of a unit root is removed from the panel before the panel is estimated again. The main end of this procedure is a segregation of the stationary from the non-stationary series, by taking advantage of power properties provided by panel unit root tests.

In order to econometrically carry out this procedure, we assume that we have a panel series of suicides, $S_i = (s_{ji}, \ldots, s_{jm})$, which produces a set of individual-based unit root tests statistics, $t_i = (t_{j1}, \ldots, t_{jm})$, where $i = \{j_1, \ldots, j_m\}$, for some $M < N$. By defining $i = i^{-j} \cup i^{j}$, such that $i^{j} = \{j\}$ $i^{1,N} = \{1, \ldots, N\}$ our objective is to estimate a binary object, ϑ_j, which takes the value of 1 if the series is stationary and 0 if the panel series is a unit root. We thereafter implement the following 3-step algorithm to separate the stationary from the unit root processes.

Step 1: Initially set $j = 1$ and $i_j = \{1, \ldots, N\}$.

Step 2: Perform a decision rule in which a panel unit root tests statistic is computed over $y_{i,}$ and we set $\vartheta i_j = (0, \ldots, 0)$ if the panel statistic fails to reject the unit root hypothesis, while we set $\vartheta i_j = 1$. Only if the later condition holds do we proceed to step 3, otherwise we stop the procedure.

Step 3: Set $i_{j+1} = i_j^{-l}$, where l is the index of the individual series which produces the highest rejection of the unit root hypothesis (i.e. produces the lowest test statistic). Thereafter, make $j = j + 1$ and return to step 2 and repeat the procedure.

To effectively carry out the SPSM approach, it is imperative to use a combination of the individual based unit root tests and panel-based unit root tests. The following sub-sections present these 'individual-panel' corresponding pairs of unit root testing procedures for first-, second- and third-generation unit root testing procedures.

First-generation unit root tests

The first generation of unit roots can be traced to the seminal contribution of Dickey and Fuller (1979), who specified the following autoregressive (AR) time series, y_t:

$$y_t = \rho y_{t-1} + e_t, \quad t = 1, 2, \ldots, T \text{ and } e_t \sim N(0, \sigma^2) \tag{8}$$

They suggest that the time series, y_t converges to an $I(0)$ stationary process as $t \to \infty$ under the conditions $\rho < 1$, while if $\rho = 1$, then the series evolves as a random walk with a variance which grows exponentially as $t \to \infty$. A more generalized form of regression (8), for the case of suicide time series (s_t), is the following Augmented Dickey-Fuller (ADF) regression:

$$\Delta sr_t = \alpha_i + \beta_i sr_t + \sum_{j=1}^{p} sr_{t-j} + e, \tag{9}$$

where $\Delta sr_t = sr_t - sr_{t-1}$, $\alpha_i = (1 - \rho)$, and $\sum_{j=1}^{p} sr_{t-j}$ is a truncated lag intended/designed to soak up any excess serial correlation. The DF test statistic used to test the unit root null hypothesis (i.e. H_0: $\beta_i = 0$) against the stationarity alternative (i.e. H_1: $\beta_i < 0$) is the t-ratio of the β_i coefficient, i.e.

$$T = \frac{yMy_{-1}}{\sqrt{^2 y'_{-1-1} My_{-1})}}, \tag{10}$$

where $M = I_T - \tau_T(\tau'_T, \tau_T)^{-1}\tau'_T$ and $\sigma^2 = \Delta y_i M_{xi} \Delta y_i/(T - 1)$. The critical values used to evaluate the computed test statistic are reported in McKinnon (1994). Nevertheless, many authors have argued that the Dickey-Fuller testing procedure lacks power in distinguishing unit root processes from stationary properties, and that using panel data unit root tests is one way of increasing the power of unit root testing procedures (Maddala and Wu 1999). Levin, Lin, and Chu (2002) (LLC hereafter) suggested thE following panel unit root testing regression:

$$\Delta sr_{i,t} = \alpha_{mi} d_{mi,t} + \beta_i sr_{i,t-1} + \sum_{j=1}^{p} sr_{i,t-j} + e_{it} \text{ for } i = 1, \ldots, N; t = 1, \ldots, T \tag{11}$$

where d_{mi} contains deterministic terms. LLC suggested a three-step procedure to perform the panel unit root test. i) Firstly, perform individual ADF test regressions to determine the optimal lag (p). Then run two auxiliary regressions, by regressing $\Delta y_{i,t}$ and $y_{i,t-1}$ against $\Delta y_{i,t-j}$ ($j = 1, \ldots, p$) and generate residual terms e_{it} and v_{it-1}, respectively and normalize these errors. ii) Secondly, regress e_{it} on v_{it}, (i.e. $e_{i,t} = \rho_i v_{i,t-1} + u_{i,t}$) and then formulate the unit root null hypothesis, tested as H_0: $\beta_1 = \beta_2 = \ldots = \beta_N = \beta = 0$ which is tested against the stationary alternative of H_1: $\beta_1 = \beta_2 = \ldots = \beta_N = \beta < 0$. iii) Lastly, estimate the ratio of the long-run to short-run standard deviations which will be used to adjust the mean of the t-statistic use to test the null versus alternative hypothesis. A well-recognized limitation of the LLC test is that β is the same for all i. To circumvent this, Im, Pesaran, and Shin (2003) (IPS hereafter) proposed a more general alternative hypothesis in which H_1: $\beta_i < 0$, $i, \ldots, N_1$; $\beta_i = 0$, $i = N + 1, \ldots, N$. As opposed

to pooling the data, IPS estimated separate unit root tests for the N cross-sections and then computed the panel test statistic as:

$$t_{N,T} = \frac{1}{N}\sum_{i=1}^{N} t_{i,L}, \tag{12}$$

where $\sqrt{N}\,\frac{t_{N,T} - }{}$. The test statistic is then standardized. IPS demonstrated better performance than the LLC test when *N* and *T* are small.

Second-generation unit root tests

Dissatisfied with the power properties and time series assumptions presented by the first-generation unit root tests, the second-generation unit root tests primarily dismissed the notion of linearity within time series variables in which nonlinearity may be mistaken for unit root behaviour. The most comprehensive nonlinear unit root testing procedure is outlined in Kapetanois et al. (2003) (KSS hereafter), who particularly specified the following ESTAR unit root test regression:

$$y_t = \gamma_i y_{t-1}\,[1\text{-}\exp(\text{-}\Phi\, y_{t-1}^2)] + \sum_{j=1}^{p}{}_i\, y_{t-i} + e_t \tag{13}$$

From equation (12), testing the unit root null hypothesis can be achieved by imposing $\Phi = 0$. Yet, given the presence of nuisance parameters under the null hypothesis, it is more feasible to test for unit roots after applying a first-order Taylor approximation, resulting in the following auxiliary regression:

$$\Delta y_t = \mu_t + \delta_i\, y_{t-1}^3 + \sum_{j=1}^{p}{}_j\, y_{t-j} + e_t \tag{14}$$

Henceforth the null hypothesis of a unit root is formally tested as H_0: $\delta_i = 0$ against the ESTAR stationary alternative of a stationary process H_1: $\delta_i < 0$, using the following test statistic:

$$t_{kss} = \frac{\sum_{t=1}^{T} y_{t-1}^3 y_t}{\sqrt{\hat{2}\sum_{t=1}^{T} y_{t-1}^6}} \tag{15}$$

The obtained t_{kss} statistic is then compared against the corresponding critical values which are tabulated in Kapetanois et al. (2003). Ucar and Omay (2009) (OU hereafter) expanded the KSS testing procedure into a panel framework based on the procedure of IPS. Their baseline panel ESTAR (PESTAR) testing regression is given as:

$$\Delta y_{i,t} = \mu_{i,t} + \delta_i y_{i,t-1}^3 + \sum_{j=1}^{p} {}_{i,j} y_{i,t-j} + e_{it}, \quad (16)$$

where the panel unit root test statistic used to test the unit root hypothesis (i.e. H_0: $\delta_i = 0$) against the nonlinear stationary alternative (i.e. H_1: $\delta_i < 0$,), is computed as the invariant average statistic of the individual KSS statistics for each series, i.e.

$$t_{NL} = \frac{1}{N}\sum_{i=1}^{N} t_{i,NL} \quad (17)$$

UO proposed the following five-step sieve-bootstrap algorithm to compute the panel unit root tests statistic. Firstly, estimate a univariate KSS regression (as in equation (13)) for each of the individual countries with the optimal lag of each individual regression being determined by the Schwartz criterion. Secondly, generate a series of bootstrapped errors (i.e. $e_{i,t} = \Delta y_{i,t} - \mu_{i,} - \sum_{j=1}^{p} {}_{i,j} y_{i,t-j}$) which are then centred as; $e_{i,t} = e_{i,t} - (T - p - 2)^{-1} \sum_{t=p+2}^{T} e_t$. Thirdly, develop an N by T matrix for the entire panel, we then produce a series of bootstrapped error terms $e_{i,t}^*$, from which derive bootstrapped series of $y_{i,t}^*$ as:

$$y_{i,t}^* = \mu_{i,} + \sum_{j=1}^{p} {}_{i,j} y_{i,t-j}^* + e_{i,t}^* \quad (18)$$

Fourthly, we generate our bootstrapped sample series of $y_{i,t}^*$ from the partial sums i.e. $y_{i,t}^*$ (i.e. $y_{i,t}^* = \sum_{j=1} y_{i,j}^*$). Lastly, we derive the bootstrap p-values for the t_{NL}^* statistic which are computed by running the following nonlinear regression:

$$y_{i,t}^* = \mu_{i,t} + \gamma_i (y_{i,t-1}^*)^3 + \sum_{j=1}^{p} \alpha_{ij} y_{i,t-1}^* + v_{it}. \quad (19)$$

Third-generation unit root tests

The third-generation unit root tests are the flexible Fourier form (FFF) type tests introduced into the econometric paradigm in the seminal work by Becker et al. (2006) and more recently popularized in the paper by Enders and Lee (2012). The idea behind these FFF-type tests is that a sequence of smooth structural breaks using the low-frequency components of a Fourier approximation (Becker et al. 2006). These tests are seen as an improvement over other structural-break unit root tests such as Perron (1989), Zivot and Andrew (1992) and Lee and Strazicich (2004; 2013), which determine structural breaks either exogenously or endogenous, the FFF function itself is not periodic such

that the Fourier approximation can still capture the shape of unknown structural shifts in a time series. The general flexible Fourier function can be specified as follows:

$$d(t) = \beta_0 + \sum_{k=1}^{n} a_k \sin\left(\frac{2\pi Kt}{T}\right) + \sum_{k=1}^{n} b_k cos\left(\frac{2\pi Kt}{T}\right), \; n \leq T/2, \tag{20}$$

where n is the number of cumulative frequency components, a and b measure the amplitude and displacement of the sinusoidal and K is the singular approximated frequency selected for the approximation. Becker et al. (2006) and Enders and Lee (2012) suggest the restriction of $n = 1$ (i.e. single-frequency components) to circumvent over-fitting problems as well as to ensure that the evolution of the nonlinear trend is gradual over time. The resulting low-frequency component can mimic structural changes which are characterized by spectral density functions which tend towards a zero frequency. Placing the restricting $n = 1$ in equation (17) and substituting the resulting regression into (13) results in the following FFF-augmented KSS 'individual' unit root testing regression:

$$y_t = \delta_i y_{t-1}^3 + \sum_{j=1}^{p} {}_j y_{t-j} + a_i \sin\left(\frac{2\pi Kt}{T}\right) + b_i cos\left(\frac{2\pi Kt}{T}\right) + v_t, \tag{21}$$

while substituting into equation (14) results in the following FFF-augmented OU 'panel' unit root testing regression:

$$y_{i,t} = \mu_{i,t} + \delta_i y_{i,t-1}^3 + \sum_{j=1}^{p} {}_{i,j} y_{i,t-j} + a_i \sin\left(\frac{2\pi Kt}{T}\right) + b_i cos\left(\frac{2\pi Kt}{T}\right) + v_t, \tag{22}$$

where $t = 1, 2, \ldots, T$ and v_t is a $N(0, \sigma^2)$ process. Following the recommendations of Enders and Lee (2012), we perform a grid search for optimal values of frequency K and lag length j, which are obtained by selecting the estimated regression which produces the lowest sum of squared residuals (SSR).

Data and premilinary overview of suicide trends in G20 countries: 1991–2016

Our empirical data, 'total suicides per 100,000 people', collected for individual G20 (minus the European Union) countries, were sourced from the Institute of Health Metrics and Evaluation (IHME, 2018) Global Burden of Disease database. The data were collected annually between 1990 and 2016. Table 1 presents the descriptive statistics of each country. In examining the overall global trends in suicide mortality rate, our empirical data suggests that on average, approximately 830,883 people died annually from suicide worldwide from 1990–2017. This corresponds to an age-standardised

suicide mortality rate of about 14.3 per 100,000 people over the period. In 2016, approximately 817,147 people died from suicide worldwide compared to 766,043 in 1990. This reflects an age-standardised suicide mortality rate of about 11.2 per 100 000 people in 2016.

A cursory look at the trends in the time series data for G20 countries indicates that the prevalence of suicide mortality varies considerably across countries and over time. We particularly note that the highest suicide averages are found in 4 out of the 5 members of the BRICS alliance of countries (Russia (38.23), India (20.12), China (16.11), and South Africa (17.91)) as well as for Japan (18.46) and South Korea (22.00), which are East Asian economies. On the other hand, lower, single-digit suicide averages are more prominent within Saudi Arabia (3.03) as a Middle-East representative, the three 'G20 members' of the MINT group of emerging economies (Mexico (5.18), Indonesia (3.90) and Turkey (3.93)), Brazil (6.71), as well as for Italy (6.67) and the UK (8.72). Finally, intermediate, double-digit averages of suicide rates are found in the remaining economies which are largely G7 and Latin American countries (Argentina (11.69), Australia, (11.79), Canada (12.00), the US (12.31), Germany (12.70), and France (18.91)). Note that these observations are somewhat contrary to conventional academic wisdom, which speculates on suicide mortality being more prevalent in emerging and less developed countries than in developed countries due to socioeconomic and behavioural factors, limited access to mental health care and the shortage of behavioural health care providers (Moneim, Yassa, and George 2011; Kumar et al. 2013; Kegler, Stone, and Holland 2017).

Table 1. Descriptive statistics

Country	Mean	Maximum	Minimum	Standard Deviation	j-b (p-value)
Argentina	11.69	12.53	10.88	0.53	2.74 (0.25)
Australia	11.79	13.35	10.47	1.08	3.30 (0.19)
Brazil	6.71	7.30	6.37	0.31	3.15 (0.21)
Canada	12.00	13.22	10.87	0.91	2.98 (0.23)
China	16.11	23.87	8.54	5.25	0.12 (1.59)
France	18.91	23.21	15.31	2.65	0.24 (1.67)
Germany	12.70	15.13	10.52	1.68	2.84 (0.24)
India	20.12	21.43	17.90	1.19	3.28 (0.19)
Indonesia	3.90	4.08	3.54	0.18	4.46 (0.11)
Italy	6.67	8.09	5.62	0.88	2.83 (0.24)
Japan	18.46	19.98	16.67	1.25	3.09 (0.21)
Mexico	5.18	5.91	4.29	0.50	1.45 (0.48)
Russia	38.23	48.22	29.30	6.46	2.68 (0.26)
Saudi Arabia	3.03	3.78	2.63	0.33	1.56 (0.46)
South Africa	17.94	21.08	13.74	2.44	3.06 (0.22)
South Korea	22.00	28.07	14.00	5.22	3.19 (0.20)
Turkey	3.93	4.87	3.01	0.69	2.87 (0.24)

Table 1. (continued)

Country	Mean	Maximum	Minimum	Standard Deviation	j-b (p-value)
UK	8.72	10.03	7.86	0.77	3.01 (0.22)
US	12.31	12.94	11.65	0.42	1.81 (0.40)

Notes: Authors own computation. j-b statistic indicates that all series are normally distributed.
Source: authors' own plot in eviews using suicide data from the Institute of Health Metrics and Evaluation (IHME) Global Burden of Disease database: 1990–2017.

Empirical results

First-generation unit root test results

Table 2 presents the results of the SPSM approach applied to the cluster of first-generation unit root tests, with Panel A reporting the results of the procedure performed on the pairs of unit root tests with drift, and Panel B showing the results for the procedure performed on pairs of unit roots performed with both drift and trend. To carry out the procedure, we first compute the individual ADF test statistics for each time series and report the results in a sequential format, with the series with the highest rejection or lowest test statistic being reported first (in our case, South Korea, when the tests are performed with drift, and Argentina, when the tests are performed with both drift and trend) followed by the series with the second-highest rejection 'test statistic' (which is now Brazil for the drift models and Russia for the drift and trend model), and so forth.

We then perform the panel unit root tests (LLC and IPS tests) in a similar sequential fashion, with the first-panel test statistic computed for the entire panel, then the second-panel statistic computed for the panel with the individual series yielding the highest rejection being removed from the panel, then the third-panel statistic is computed for the panel with the individual series yielding the highest and second-highest rejection rates being removed from the panel, and this procedure is carried out in this fashion of a consecutively reducing panel until we have segregated the stationary from the non-stationary panel. The optimal lag for each of the performed tests is determined by minimising the modified AIC, as suggested by Ng and Perron (2001). The results show some discrepancies in the results obtained. For instance, when the procedure is carried out with drift, the LLC statistic identifies six stationary processes (i.e. South Korea, Brazil, Japan, China, the US and France) whereas the IPS statistics find no stationary series. Nevertheless, we cannot consider these results to be conclusive since they ignore important nonlinearities and structural breaks found in the data. We address these concerns in the following sub-sections.

Table 2. SPSM approach to ADF, LLC and IPS nonlinear unit root tests

Sequence	Min. ADF stat	Series	LLC stat	IPS stat
1	–3.22** [1]	South Korea	–4.25*** (0.00)	1.01 (0.84)
2	–2.81* [0]	Brazil	–3.32*** (0.00)	1.46 (0.93)
3	–2.23 [1]	Japan	–2.83*** (0.00)	1.82 (0.97)
4	–1.95 [1]	China	–2.72*** (0.00)	2.06 (0.98)
5	–1.83 [2]	US	–1.83** (0.03)	2.32 (0.98)
6	–1.70 [1]	France	–1.79** (0.03)	2.51 (0.99)
7	–1.69 [4]	Italy	–0.87 (0.19)	2.65 (0.99)
8	–1.62 [1]	Germany	–0.33 (0.37)	2.89 (0.99)
9	–1.61 [1]	UK	–0.04 (0.48)	2.76 (0.99)
10	–1.40 [0]	Mexico	0.92 (0.82)	2.92 (0.99)
11	–1.22 [2]	Argentina	1.02 (0.85)	2.86 (0.99)
12	–0.85 [2]	Russia	0.94 (0.83)	2.96 (0.99)
13	–1.04 [1]	Australia	0.76 (0.78)	2.93 (0.99)
14	–0.65 [1]	South Africa	1.03 (0.85)	3.04 (0.99)
15	–0.55 [0]	Turkey	0.97 (0.83)	2.91 (0.99)
16	–0.51 [4]	Saudi Arabia	0.98 (0.84)	2.71 (0.99)
17	–0.35 [0]	Canada	0.84 (0.80)	2.70 (0.99)
18	0.27 [2]	Indonesia	1.75 (0.96)	2.71 (0.99)
19	0.39 [1]	India	1.19 (0.88)	2.05 (0.99)

Notes: ***, **, * represent the 1%, 5% and 10% critical levels, respectively. Optimal lag lengths reported in []. P-values reported in ().
Source: authors own plot in eviews using suicide data from the Institute of Health Metrics and Evaluation (IHME) Global Burden of Disease database: 1990–2017.

Second-generation unit root test results

Table 3 presents the results of the SPSM approach applied to our second-generation unit root tests of KSS (2003) and OU (2009). As before, we begin the process by computing the individual KSS statistic for each individual series, which is reported in sequence of the lowest statistic (highest rejection) to the highest test statistics (lowest rejection). The sequences, as well as the estimated values of these individual statistics, are found in the first three columns of Table 3. After that, we apply the OU sieve bootstrap procedure to compute the corresponding OU panel statistic, firstly for the entire panel, and then on a reducing panel set in which individual series with the highest rejection are sequentially removed until we effectively segregate the stationary from the non-stationary panel. These panel unit root statistics are reported in the fourth column of Table 3 whilst the bootstrap p-values and the associate optimal lags lengths are found in the fifth and sixth columns of Table 3, respectively.

After completing the procedure, we find the panel of stationary time series for 11 of the G20 countries (the United Kingdom, Brazil, Indonesia, France, Italy, Chi-

na, Australia, Canada, Germany, Russia and India) while the remaining countries (Turkey, South Africa, South Korea, Argentina, Japan, the United States, Saudi Arabia and Mexico) exhibit non-stationary behaviour. Interestingly, the stationary panel consists of six advanced and five emerging economies of the G20 panel, while the non-stationary panel primarily consists of emerging non-G7 member states. We also note that these results can also be compared to those obtained in the previous study of Chang et al. (2017), who used a similar SPSM framework applied to a sample of 23 OECD countries of which six of these countries (the United Kingdom, France, Italy, Canada, Japan and the United States) belong to our panel of G20 countries. However, in contrast to Chang, Cai, and Chen (2017), who found unit root behaviour for all these 'commonly sampled' economies, our current findings point to stationarity in five out of six of these countries.

Table 3. SPSM approach to OU and KSS nonlinear unit root tests

Sequence	Series	Min. KSS	OU statistic	p-value	Lag
1	UK	−6.89***	−2.19**	0.02	0
2	Brazil	−5.65***	−2.18**	0.02	0
3	Indonesia	−4.14***	−2.17*	0.03	0
4	France	−3.62***	−2.14*	0.04	3
5	Italy	−3.30***	−2.09*	0.04	1
6	China	−2.79***	−1.92*	0.06	1
7	Australia	−2.28**	−1.91*	0.06	4
8	Canada	−2.05*	−1.86*	0.06	2
9	Germany	−1.76	−1.79*	0.08	6
10	Russia	−1.75	−1.78*	0.08	4
11	India	−1.72	−1.68*	0.09	1
12	Turkey	−1.43	−1.64	0.10	0
13	South Africa	−1.09	−1.61	0.10	1
14	South Korea	−0.97	−1.61	0.11	1
15	Argentina	−0.68	−1.55	0.12	2
16	Japan	−0.24	−1.26	0.21	1
17	US	−0.15	−0.71	0.48	2
18	Saudi Arabia	0.15	−0.26	0.79	0
19	Mexico	0.92	−0.21	0.78	1

Notes: ***, **, * represent the 1%, 5% and 10% critical levels, respectively. p-values for OU statistic generated through a bootstrap of 10,000 replications.
Source: authors own plot in eviews using suicide data from the Institute of Health Metrics and Evaluation (IHME) Global Burden of Disease database: 1990–2017.

Third-generation unit root test results

Table 4 presents the results for the SPSM applied to the third-generation unit root testing procedure. These tests vary from the first- and second-generation tests by including a flexible Fourier approximation to the unit root tests which, by design, are intended to capture a series of unobserved, smooth structural breaks and have been demonstrated to be more powerful than other structural breaks or nonlinear unit root tests (Becker et al. 2006; Enders and Lee 2012). Recall that the procedure is carried out by first estimating individual KSS-FFF test statistics for the individual countries and then arranging these test statistics in order of lowest to highest values. The results of this exercise are reported in the first three columns of Table 4. Then the OU bootstrap procedure is carried out as previously, first for the whole panel, then on a reducing panel in which the KSS-FFF statistic with the highest rejection is sequentially removed in each stage of the estimation process.

The obtained panel statistics are found in column four of Table 4, and the bootstrap p-values are given in column five. The findings of the grid search to identify the optimal frequency component, k^*, and lag length, are reported in columns six and seven, respectively. In a nutshell, our results point to a stationary panel of countries inclusive of Brazil, Russia, Japan, Canada and China, whilst the non-stationary panel consists of Argentina, the United States, South Africa, Saudi Arabia, Australia, Indonesia, Turkey, France, South Korea, India, Italy, Mexico, the United Kingdom and Germany. Notice that the stationary panel is smaller than that obtained for the KSS test performed without a FFF approximation, and this panel consists of 3 of the BRICS member states and two G7 member states. Further note that these findings are now more similar to those of Chang, Cai, and Chen (2017), who also found that by including a FFF approximation in the testing procedure, most industrialized countries fall under the non-stationary panel of suicides. Overall, these findings highlight the importance of accounting for both nonlinearities and smooth structural breaks in distinguishing stationary from non-stationary series when checking the integration properties of suicides.

Table 4. SPSM approach to OU-FFF and KSS-FFF nonlinear unit root tests

Sequence	Series	Min. KSS	OU statistic	p-value	K*	Lag
1	Brazil	–4.61***	–2.05*	0.04	1	5
2	Russia	–4.19***	–2.01*	0.04	1	6
3	Japan	–4.18***	–1.98*	0.05	5	6
4	Canada	–3.40***	–1.93*	0.05	5	6
5	China	–3.01***	–1.87*	0.06	5	6
6	Argentina	–2.93***	–1.51	0.13	5	5
7	US	–2.42***	–1.36	0.18	5	6
8	South Africa	–2.39**	–1.32	0.19	5	6
9	Saudi Arabia	–1.80*	–1.29	0.19	5	6

Table 4. (continued)

Sequence	Series	Min. KSS	OU statistic	p-value	K*	Lag
10	Australia	–1.59	–1.28	0.20	5	5
11	Indonesia	–1.55	–126	0.21	5	6
12	Turkey	–1.33	–1.26	0.21	5	6
13	France	–1.17	–1.25	0.21	5	5
14	South Korea	–1.08	–1.23	0.22	5	6
15	India	–0.22	–1.22	0.22	5	6
16	Italy	0.29	–1.21	0.23	5	6
17	Mexico	0.38	–0.90	0.37	5	6
18	UK	1.71	–0.73	0.46	5	6
19	Germany	2.72	–0.68	0.51	5	6

Notes: ***, **, * represent the 1%, 5% and 10% critical levels, respectively. p-values for OU statistic generated through a bootstrap of 10,000 replications.
Source: authors own plot in eviews using suicide data from the Institute of Health Metrics and Evaluation (IHME) Global Burden of Disease database: 1990–2017.

Conclusion

Primarily motivated by the lack of empirical evidence due to the novelty of the field in the research study, we have investigated the possibility of persistence in suicides in G20 countries between 1990 and 2017. We consider this research worthwhile since suicides have been recently identified by the World Health Organization as one of the leading causes of mortalities globally. The selection of the G20 countries as a case study is important since these countries are currently the centre of global economic dominance and hence the potential influence of these countries in reducing global suicides cannot be overlooked or taken for granted. Previous studies examined possible persistence in suicides for the US, OECD countries and Turkey; hence, they lacked a global outlook on the subject matter. Empirically, we rely on the SPSM approach of Chortareas and Kapetanois (2009), which we apply to three generations of unit root tests, i.e., i) conventional unit root tests, ii) nonlinear unit root tests and iii) FFF-based nonlinear unit root tests. After controlling for nonlinearities and smooth structural breaks in the data, we find that only Brazil, Russia, Japan, Canada and China have stationary suicides whilst we fail to find any convincing evidence of stationarity amongst the remaining countries, which are mainly industrialized, G20 member states.

There are some important policy implications which can be gathered from our findings. For starters, we concur with the WHO and particularly advise that more advanced members of the G20 countries should move toward adopting formal national suicide prevention strategies which are tailored according to each of the members' social, religious and economic standards. Other non-G20 countries could then 'copy' the strategies implemented by G20 countries by identifying with member states that

best correspond with their social, economic, religious and regional standings. Such suicide prevention strategies should primarily emanate from health and social ministries within each economy and then spread across different sectors of the economy, primarily the health care sector, business sector, education sector (primary, secondary and tertiary levels of education), as well within local communities. As detailed in the WHO's *Mental Health Plan* report (2013), prevention strategies could include surveillance measures, means restrictions, media guidelines, stigma reduction, as well as raising public awareness and training.

From an empirical standpoint, a comprehensive system of adequate data collection should be put into place by the G20 as well as non-G20 member states. It could provide a rich source of suicide numbers across the different sexes, races, age groups, religious backgrounds and other relevant socio-demographic factors. This would require more rigid data-collecting institutional structures dedicated to collecting and processing such time series, which would, in turn, naturally enrich the future academic path of research on suicides as well as forecasting practices, not only for G20 countries but other less researched recognized economies in less developed regions of the world. However, with the currently available data, one possible avenue for near-future research would be to extend upon the current knowledge on the so-called 'natural-rate of suicides' literature, which could be perceived as a natural extension of the knowledge gained from investigating the persistence of suicides.

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Utrzymywanie się samobójstw w krajach G20 w latach 1990–2017: podejście SPSM do trzech generacji testów pierwiastka jednostkowego

Samobójstwa stanowią wszechstronną miarę dobrego samopoczucia psychicznego, stabilności emocjonalnej, a także satysfakcji z życia, a ostatnio zostały uznane przez Światową Organizację Zdrowia (WHO) za główny problem zdrowotny na świecie. Państwa G20 są potęgą w obszarze globalnego zarządzania polityką gospodarczą, a tym samym mają zdolność wpływania na kształtowanie się globalnego wskaźnika samobójstw. Stosując metodę SPSM do trzech generacji testów pierwiastka jednostkowego, w opracowaniu zbadano własności integracyjne samobójstw w krajach G20 w latach 1990–2017. Wyniki uzyskane ze wszystkich trzech generacji testów dostarczają mocnych dowodów na utrzymywanie się samobójstw w większości państw członkowskich G20. Uzasadnia to istnienie aktualnego programu strategicznego forsowanego przez WHO, zmierzającego do redukcji odsetka samobójstw do docelowego poziomu 10 procent. Wskazano ponadto, że takie strategie powinny rozprzestrzeniać się z państw G20 na pozostałe państwa świata.

Słowa kluczowe: samobójstwa, metoda SPSM, nieliniowe testy pierwiastka jednostkowego, testy pierwiastka jednostkowego w postaci Fouriera, państwa G20

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Does Social Trust Influence Charitable Giving for NGOs?

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Abstract

The purpose of the paper is to find a link between the level of NGOs' revenues and the trust in non-governmental organisations (NGOs). We investigate if social trust, as measured by the Charities Aid Foundation, influences their charitable revenues. We analyse the revenues of NGOs in three countries: Poland, Croatia and the United Kingdom. We analyse the change in social trust in these countries and revenues in the years 2013–2017. The design and methodology approach includes a literature review and panel regression analysis. The main results of the panel regression analysis indicate that the amount of donations depends not only on the level of public trust but also on certain external and independent factors. We find that NGOs revenues vary from country to country due to different levels of economic development and wealth of countries. The results also show that apart from demographics, NGOs' revenues and the donations they receive are also influenced by the philanthropic goal, the number of years since it was established (the age of the organization) and the financing model. The research limitations include the selection of only a few countries for the analysis. This paper's originality and value lie in the fact that the problem of low social trust in NGOs is analysed by linking it with the NGOs' revenues.

Keywords: NGOs, civil trust, revenues, donations

JEL: M41, I31

Introduction

Non-governmental organisations' (NGOs) incomes depend on public trust (Zasimova and Kolosnitsyna 2018). A decrease in public trust for NGOs is influenced by a lack of access to information on their performance, operational model, low experience, scandals (Charities Aid Foundation 2014; Mersianova, Jakobson, and Krasnopolskaya 2015), or the government's anti-NGO policy (Flikke 2016). The recent research from Waniak-Michalak et al. (2020), however, indicates that the development of accounting and other regulations of NGOs' activities do not affect the civil trust for NGOs.

Although low public confidence does not cause a decrease in philanthropy, it changes how the aid is distributed. Research shows that in many countries, people prefer giving money and other resources personally to those in need rather than through NGOs (Mersianova, Jakobson, and Krasnopolskaya 2015). Some researchers state that the decrease in social trust can influence NGOs' future charitable income and thus their ability to continue operations (Hou, Zhang, and King 2016; Zasimova and Kolosnitsyna 2018). The question if this is true is even more important in the face of recent accidents, epidemics, and the impending world economic crisis.

To answer the research question, we used a literature review, regression analysis, and non-parametrical tests. Three countries were selected for the research: Poland, with an average score among all post-communist countries in the World Giving Index ranking (Charities Aid Foundation 2018), Croatia – the first (the best) among all post-communist countries in the World Giving Index ranking (Charities Aid Foundation 2018), and the United Kingdom – one of the countries with the highest level of social trust.

Our paper is organized as follows. In the first section, we describe civil trust – its meaning, measurement, and connection with the development of NGOs. In the second section, we present research on the factors that influence the revenues of NGOs. In the third section, we describe the hypothesis development and methodology used. In the fourth section, we explain the panel regression analysis results that we conducted to determine if the social trust in particular countries influences NGOs' revenues. Finally, the conclusions are presented.

Civil trust

Donors can find it difficult to assess whether their goals and NGOs' achievements have been met because of information asymmetry. In most cases, owners (donors) who have specific expectations of the quality of NGOs' effects (goods, services, aid effects) may find it difficult to judge if they are satisfied. Even publicly available NGO reports may not solve the problem. Sargeant and Lee (2002) state that trust does not result from knowledge, but from faith; so trust depends not on the quality of information disclosed by NGOs but on the belief that someone controls them.

Waniak-Michalak, Perica, and Leitoniene (2020) posit that other factors affect social trust, such as the lack of institutional mechanisms, the lack of an empathic society, and negative media coverage. Therefore, the level of trust will depend not so much on the effects of NGOs' current activities, but on indirect factors such as culture, other people's opinions, the economic and social situation, and general trust in private institutions. As public confidence in NGOs declines, the pressure on NGOs' accountability and control increases (Wallace 2004).

On the one hand, trust in any organisation can be undermined by embezzlement, low transparency, and corruption (da Cruz et al. 2015). On the other hand, civil trust may easily increase due to increased government oversight, the existence of watchdog agencies, and the introduction of ethical codes (Cordery and Baskerville 2011). Public trust in NGOs can also be built through international events, national government policies, disasters, and other crises, as well as EU policies (Kucheryavaya 2016). Social trust in NGOs can be determined by historical facts, culture, and the experience of citizens in establishing and supporting such organisations in the past. In countries that have been dependent on other countries for many years and in countries with regimes or communism, public trust for NGOs can be low. It is difficult to trust the unknown (Kucheryavaya 2016). Lee, Johnson, and Prakash (2011) posit that the media play an important role in creating trust in the NGO by providing information on their activities. Howard stated in 2003 that post-communist countries (like Poland and Croatia) have lower levels of development of the NGO sector than other countries.

Civil trust has three benefits for the charity sector: increased public funding, organisational stability, and ongoing independence (Cordery and Baskerville 2011). Scandals and accidents harm not only the organisation in which they occurred but the entire sector (Farwell, Shier, and Handy 2019). Without proper sector self-regulation and response to problems, social trust is falling for all NGOs, while affecting the revenues of the whole sector (Cordery and Baskerville 2011). However, as some cases show, social trust, even in the face of huge scandals, is restorable (Bryce 2007).

Researchers point to many factors that affect social trust, one of which is economic status (McDougle and Lam 2014). Grønbjerg's study (2009) shows that people with lower education levels and lower incomes have little trust in NGOs. Therefore, it should be assumed that the best opinion about NGOs will be held by donors, and the lowest by people who would be regarded as beneficiaries.

In 2014, Poland and Croatia saw an increase in public confidence, which can be linked to the natural disasters at that time. In the face of tragedy, people decide to donate, not to a specific organization, but to a specific purpose. In 2016 and 2017, a decrease in public trust in NGOs can be observed in Poland. The main reason for this was political changes, which also brought changes in citizens' world view. The media disclosure of facts indicating dishonesty of the management of some NGOs caused some citizens to turn against them.

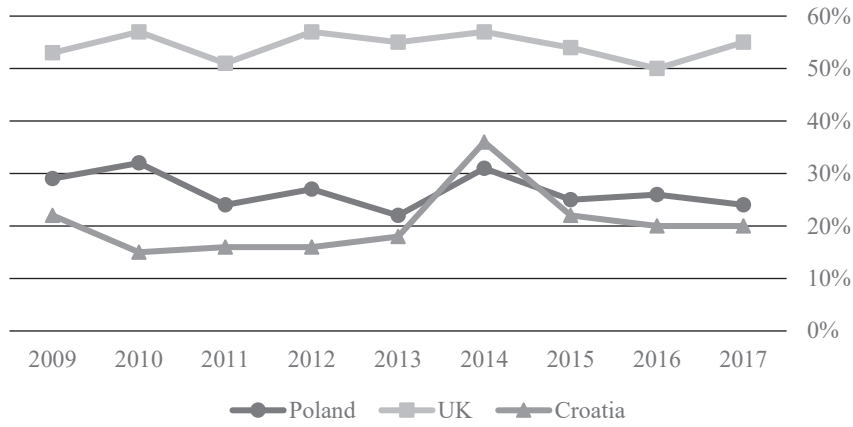

Figure 1. World giving index – global score, 2009–2017
Source: own elaboration based on data from the Charities Aid Foundation, https://www.cafonline.org/ (accessed: 1.01.2021).

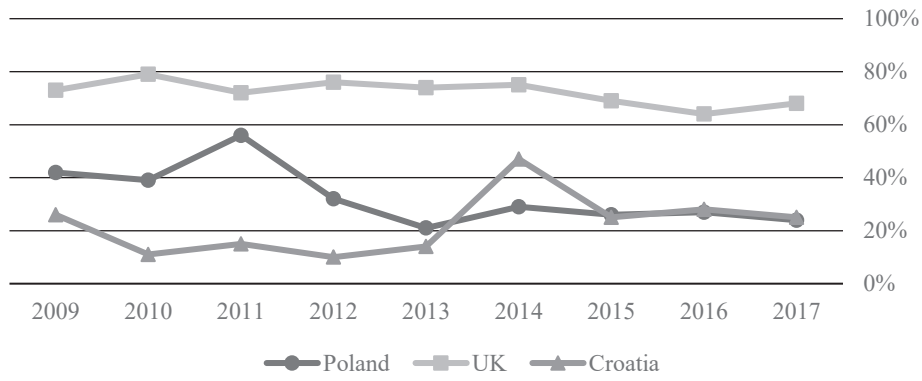

Figure 2. World giving index – for donating money, 2009–2017
Source: own elaboration based on data from the Charities Aid Foundation, https://www.cafonline.org/ (accessed: 1.01.2021).

Analysing Figures 1 and 2, it can be argued that general trust in NGOs does not always lead to an increase in philanthropic donations. One should remember that a donor is always financially better off not giving (Zagefka and Trevor 2015). Financial support for NGOs may be conditioned by economic or psychological factors (Mohammad et al. 2017), e.g. whether others also give, or whether the benefits for the donor are sufficient and visible (donors like to be publicly recognised for their generosity). List and Peysakhovich (2011) stated that giving aid is sensitive to economic factors such as GDP, S&P ratio, and consumer spending. At the same time, they noted a negative correlation between the unemployment rate and individual giving.

NGO revenues and hypothesis development

Some researchers state that the key source of NGOs' financing should be grants, not individual giving. NGOs that do not use public money to finance their activities struggle to survive (Burger and Owens 2014). Moreover, NGOs that have been awarded public grants in previous years are likely to receive it in subsequent years. Therefore, the likelihood of obtaining funding in these cases depends neither on efficiency nor public confidence, because grants are awarded based on habit rather than merit (Burger and Owens 2014, p. 1).

Lecy (2010) and Burger and Owens (2014) posit that larger and older organizations have a better chance of survival and higher income. The smallest organisations may be the least affected by changes in public trust, as they often benefit from the donations of a limited small group of donors (Wallace 2004). However, other research indicates that NGOs operating on a small scale, locally, may benefit from greater social trust than large organizations (Molenaers, Dewachter, and Dellepiane 2011). Prentice (2016) believes that NGOs' revenues are influenced by economic conditions such as GDP and regional revenues. Also, NGOs' revenues may be negatively or positively impacted by an economic crisis. During a crisis, organisations that rely heavily on government grants or individual donations may experience the greatest financial problems. On the other hand, crises stimulate volunteering and the diversification of funding sources for NGOs (Tzifakis, Petropoulos, and Huliaras 2017).

Some researchers believe that the individual characteristics of NGOs are not important for the amount of donations received. Focusing an organization on a specific purpose, allowing donors to choose the purpose for which their donations will be used, reduces the importance of other factors that influence the organization's income. However, this effect diminishes with the increase in the number of NGOs offering donors the possibility to manage their donations (Nunnenkamp and Öhler 2012). Also, NGOs' use of financing sources other than donations may result in a decrease in individual donations. In this case, donors may think that the organisation can manage without their support (Nunnenkamp and Öhler 2012).

The positive impact of public trust on the value of donations to NGOs has been identified in many publications (Çarkoğlu and Erdem Aytaç 2017). However, social trust is one of several factors influencing individual giving alongside demographic, economic, and cultural factors (Bekkers and Wiepking 2011). We also consider that research on factors that influence individual giving also indirectly concerns factors that influence social trust. Age, education, nationality, as well as the level of social trust, may justify the propensity to give. Trust in organizations may determine individual giving, but also supporting organizations may indicate high trust in them. Aytaç, Çarkoğlu, and Yıldırım (2017) have shown that trust in people does not determine the level of trust in organisations and vice versa. This conclusion is all the more surprising because NGOs operate as a result of the cooperation of many people, often neigh-

bours, colleagues, and families. The level of trust in another person should influence trust in social organisations and thus, individual giving.

As many research papers state, people generally trust NGOs more than other organizations. However, the level of trust varies across countries and time (Rutley and Stephens 2017). Some authors claim that general trust in NGOs does not influence charitable giving (Hager and Hedberg 2016) and that the level of civil trust is characterized by low variability over time (O'Neill 2009).

Other researchers state that NGOs' revenues are formulated by NGOs' organizational and beneficiary characteristics (Aschari-Lincoln and Jäger 2015), such as their field and region of activity. We believe that philanthropic goals can have a significant impact on the organization's income. People most often support organizations that carry out activities considered by donors to be the most important. Different goals may be more important at different times, but certainly not every charity will enjoy the same public support. Similarly, the country of the activity or the territorial scope of the action (local, national, international) can have a significant impact on NGOs' revenues. As the scope of NGOs' activities increases, revenues may be higher.

The research presented above leads to the formulation of the research hypothesis.

H1. Social trust does not affect the organization's income; it is influenced by other external and independent factors.

We also formed detailed hypotheses:

H1.1 NGOs' revenues are determined by demographic and economic factors (Wiepking and Bekkers 2012; Prentice 2016);

H1.2 NGOs' revenues depend on the financing model of the organisation (Nunnenkamp and Öhler 2012; Burger and Owens 2014);

H1.3 NGOs' revenues depend on their age (Lecy 2010; Burger and Owens 2014);

H1.4 NGOs revenues depend on their philanthropic goals.

We will concentrate on external and other than organizational choice factors that influence NGOs' revenues. We will not consider human resources management, project management, financial management, organizational management, or communication strategy issues as they are created and adjusted by the NGOs.

Methodology

The research was conducted on a sample of 167 NGOs from three countries: Poland, Croatia, and the UK. A total of 100 NGOs were selected for the sample from the NGO register in each country. Subsequently, we rejected NGOs that did not report for all years of operation in the period 2013–2017, those that were exempted from preparing financial statements due to low revenues, and those whose reports were incomplete, illegible, or did not use donations as a source of financing.

Following data collection, panel regression analysis was conducted for external factors that influence NGOs' revenues and World Giving Indices (WGI) for the coun-

tries. We used the World Giving Index (global) and the World Giving Index (donating) as measures of social trust. Compared to WGI (donating), WGI (global) considers not only the willingness to make donations, but also the willingness to help others and spend time volunteering. The research cannot be conducted for the period 2018–2020 because the WGI is published with a one-year delay, and that the 2019 WGI ranking was not prepared by Charities Aid Foundation due to a change in the methodology of data collection in some countries and the need to determine the impact of this change on research results.

In the first stage, we used the pooled OLS as the estimator for panel data. Although this is unlikely to be adequate in most cases, it provides a baseline for comparison with more complex estimators. At the second stage of the analysis, we conducted an F-test to compare the pooled OLS against the principal alternatives, the fixed-effects and random-effects models. We chose the final estimator using the Hausman test to probe the consistency of the GLS estimates if OLS is not adequate.

The HDI (Human Development Index) was used as a proxy for the trust indicator (WGI), which, to a much greater extent than the GDP per capita indicator, measures the real standard of living of people worldwide and can thus be used as an economic and social measure. The following independent variables were used as representations of various dimensions of external and independent factors influencing revenues of NGOs:

1. HDI as a measure representing demographic and economic factors.
2. WGID – World Giving Index Global – as a measure of civil trust.
3. WGID – World Giving Index in donating – as a measure of civil trust.
4. SHARE – Share of donations in total revenues as an indicator of the organization's financing model.
5. AGE – number of years since the establishment of the organization.
6. GOAL – the main philanthropic goal/activity of the organization. We distinguished four areas of philanthropic aid: helping children (labelled 1); helping adults and generally sick people (labelled 2); helping animals and the environment (labelled 3); supporting sport and culture (labelled 4).
7. Country – as a control variable to differentiate between countries, 1 for Poland, 2 for Croatia, and 3 for the UK.
8. INTER – a dummy variable to recognise the international activities of the NGO that may influence revenues.
9. CORPF – a dummy variable to recognise if the NGO was set up by a corporation and receives grants from the founder every year.

Below in Table 1, we present descriptive statistics of the variables.

The descriptive statistics of continuous numerical variables indicate high variability of the values reported by the NGOs selected for the test sample. Donations from the surveyed NGOs constituted, on average, 50% of all income, although there were some NGOs that did not receive donations in particular years. This most often concerned young organisations whose income (mainly membership fees) in the first years of operation was

very low. The age of organisations included in the research sample also varied. The sample included NGOs that had operated on the market for several decades and those that had been established between 2013 and 2017. Revenues and donations were transformed (standardized) by the amount of the average monthly salary in a given country in a given year. In this way, the nominal differences in NGOs' revenues between countries resulting from different income levels of the population were eliminated. Young organisations earned the lowest incomes. At the same time, a decrease in revenues and donations can be observed in subsequent years, despite the reported increase in trust in NGOs.

Table 1. Descriptive statistics of the variables

Variable	Year	N	Mean	Std. Deviation	Minimum	Maximum
Share	2013	131	0.51	0.39	0.00	1.00
	2014	158	0.48	0.39	0.00	1.00
	2015	164	0.48	0.39	0.00	1.00
	2016	166	0.50	0.39	0.00	1.00
	2017	167	0.51	0.39	0.00	1.00
	Total	786	0.50	0.39	0.00	1.00
Age	2013	158	10.70	8.83	0.00	61.00
	2014	164	11.27	8.94	0.00	62.00
	2015	165	12.20	8.97	0.00	63.00
	2016	167	13.04	9.03	0.00	64.00
	2017	167	14.04	9.03	1.00	65.00
	Total	821	12.27	9.02	0.00	65.00
Revenues*	2013	158	668.30	3321.49	0.00	41078.80
	2014	164	879.12	4177.16	0.00	48960.13
	2015	165	856.14	3849.50	3.99	45738.27
	2016	166	738.50	3555.94	4.15	45546.26
	2017	167	849.66	3752.65	6.84	45516.33
	Total	820	799.41	3736.73	0.00	48960.13
Donations*	2013	158	396.00	3113.60	0.00	39129.38
	2014	164	600.90	4022.64	0.00	46936.34
	2015	165	590.83	3701.30	0.00	43605.89
	2016	166	462.23	3376.40	0.00	43471.39
	2017	167	579.69	3584.20	0.00	43251.06
	Total	820	527.00	3567.83	0.00	46936.34

* in amount of average annual salaries in the country in the year
Source: own elaboration of data from the NGOs financial and activity statements.

The results presented in Table 2 show that the lowest revenues are achieved by organisations that help animals and protect the environment. The Anova analysis showed that the differences between the averages in the different groups are significant, i.e. the organisation's purpose, country of operation, and international activity influence its total revenues and donations. The analysis also allowed us to categorize individual factors according to the means.

Table 2. Means of categorical variables

Categorical variable		Donation		Revenue	
		N	Mean	N	Mean
Country	Poland	287	919.86	287	1249.55
	Croatia	239	473.37	239	890.61
	UK	294	187.10	294	285.84
	Total	820	527.00	820	799.41
Goal	Children	243	1057.53	243	1371.07
	Adults and sick people	285	190.59	285	478.03
	Animals and environment	142	70.84	142	216.16
	Sport and culture	150	738.57	150	1036.08
	Total	820	527,00	820	799,41
International activity	No	711	480.17	711	745.63
	Yes	109	832.76	109	1149.89
	Total	820	527.03	825	799.37

Source: own elaboration of data from the NGOs' financial and activity statements.

Results and discussion

Conducting the F-test, we compared the pooled OLS against the principal alternatives, the fixed-effects and random-effects models. We chose the final estimator using the Hausman test to probe the consistency of the GLS estimates if OLS is not adequate. It turned out that all four MNK panel models were not correct, but models with established effects were more appropriate. The Wald test demonstrated that time effects were not significant and thus not included in the models.

Table 3. Panel regression analysis (models with fixed effects)

Variables	logdonation (Model 1)	logrevenue (Model 2)	logdonation (Model 3)	logrevenue (Model 4)
const	**38.35*** (20.25)	**36.23***** (6.19)	19.31 (12.71)	**29.45***** (7.82)
SHARE	**2.58***** (0.66)	−0.06 (0.04)	**2.59***** (0.67)	−0.06 (0.04)
HDI	**−44.09*** (25.85)	**−42.25***** (7.90)	−19.49 (15.62)	**−32.93***** (9.70)
AGE	**0.03***** (0.01)	**0.01***** (0.001)	**0.03***** (0.01)	**0.01***** (0.002)
WGIG	6.95 (6.63)	**8.21***** (2.05)	-	-
WGID	-	-	0.19 (2.68)	**3.97**** (1.62)
R2 (adjusted)	0.45	0.16	0.45	0.15

Robust standard errors in parentheses

*** p < 0.01. ** p < 0.05. * p < 0.1

Source: own elaboration of data from NGOs' financial statements, data from the Charities Aid Foundation, https://www.cafonline.org/ (accessed 1.01.2020); data on Subnational Human Development Index (4.0), https://globaldatalab.org/shdi/shdi/POL/?interpolation=0&extrapolation=0&nearest_real=0 (accessed: 1.01.2020).

In the results presented in Table 3, four variables (INTER, COUNTRY, CORPF and GOAL) were included in the fixed effects, which indicated that they influence the NGOs' revenues and donations. It also indicates that there are significant differences in the NGOs' revenues from each country as measured by the amount of average salaries. The differences are also visible in nominal values, which is due to the countries' different levels of economic development and wealth. The variable that determines international activities has been shown to be significant, so NGOs that operate internationally have better chances of attracting donors from other countries and collect donations for their activity as they include more people all over the world.

The regression analysis (Table 2) has established that public trust, as measured by the World Giving Index, does not affect the amount of donations received by NGOs. Only for revenues was the social trust measure with the willingness to donate significant. We cannot interpret this anomaly, i.e., why for donations the measure is not significant, but for total revenue it is. The sign of WGID is positive in both models; however, only for total revenues is it significant. We conclude that it may result from the wrong presentation of financial data in the statements that we used. In some statements, the position "donations" or "voluntary income" could be undervalued, and some types of donations were included in other positions of the income statement. Also, in the survey where Charities Aid Foundation respondents were asked about the donations they made, they could think about things that they purchased from foundations, playing a lottery, or other activities. The revenues from these kinds of events are presented in other positions of the income statement, as revenue from sales or other charitable activities.

At the same time, another measure proved to be important for donation levels – HDI, an indicator that measures not only the level of socio-economic development but also the level of happiness. This would confirm previous observations of increased generosity of society in crisis and disasters. Moreover, as other research indicates, poorer people give a substantially greater proportion of what wealth they have (Zagefka and Trevor 2015).

The impact of HDI on NGO revenues can also be explained by Bekkers and Wepking's theory (2011). They identified eight potential mechanisms as being important for motivating donations: "awareness of need," "solicitation," "costs and benefits," "altruism," "reputation," "psychological benefits," "values," and "efficacy." In difficult times (i.e. a crisis), the consequences of not helping others can be worse than the consequences of helping (or the costs). It is not about choosing between benefit and cost, but the cost of helping and the cost of not helping. One of the three components of HDI is the life expectancy index – the lower the life expectancy at birth, the lower the HDI. Some studies (according to terror management theory) demonstrate that an awareness of one's mortality can increase donations (Greenberg and Arndt 2012).

However, the most significant aspect for the value of donations and total revenue is the age of NGOs, which can be a sign of experience and reputation. Young NGOs spend more time establishing their organization's reputation and building donor base, Age is also correlated with size, so they can afford professional fundraising staff mem-

bers. Trussel and Parsons (2007) used NGO age as the measure of their reputation. They also posited that new organizations need time to establish themselves with donors and achieve name recognition. Our findings are in line with the result of a study by Lee (2017), who found that smaller revenue in organizations in Africa is significantly associated with a shorter age of organizations. Berret and Holliday (2018) also state that older organizations have greater resources.

Donations also depend on the share of donations in total revenue. Our research indicates that the amount of donations received by NGOs depends on their business model. The more significant the source of funding, the more can be expected. Organizations that have decided to run a commercial activity or to use public funding will put less emphasis on obtaining donations.

Conclusions

This article is part of a broad scientific discussion on the importance of public trust in the activities of non-governmental organisations. In the era of growing competition of NGOs for financial resources, it is extremely important to know which factors influence the amount of resources they obtain. The main aim of this study was to state whether and how the level of public trust and external, independent factors influence the donations received by NGOs. To answer this question, research was conducted on a sample of NGOs from Poland, Croatia and the United Kingdom, between 2014–2017, to examine the impact of demographic and economic factors, social trust, age of the organisation, the purpose of the activity, and the international activities of the NGOs on the donation income. The article found evidence of certain external and independent factors that influence the donations NGOs receive.

The main results of the panel regression analysis indicate that the amount of donations depends not only on the level of public trust, but also on certain external and independent factors. We conclude that public trust is not a critical factor for the volume of donations. This study provides further evidence of external and independent factors and links them to the volume of donations in relation to previous studies.

This study gives an insight into the external and independent factors underlying charitable activities, showing how they positively influence the donations to NGOs. We find that NGOs' revenues vary from country to country, due to different levels of economic development and wealth. The results also show that apart from the demographic area, the amount of revenues and the amount of donations to NGOs are also influenced by the NGO's philanthropic goal, age and financing model.

Among the surveyed NGOs, the lowest income and donations were achieved by young organisations and organisations that help animals and protect the environment. We also found that when NGOs operate internationally, they are more likely to attract donors from other countries and collect donations for their activities by engaging more people from around the world. These results also show that a higher HDI,

an indicator that measures not only the level of socio-economic development but also the level of happiness, is important for donations. This confirms previous findings of the literature on the increased generosity of society during crises and disasters.

Our research indicates that the greatest importance for the value of donations and total revenues is the NGOs' age. We believe that age can be a sign of experience and reputation, which can positively influence the amount of donations. This study also shows that the amount of donations received by NGOs depends on their business model. This suggests that as donations become a more important source of funding, higher levels of donations can be expected. Organisations that have decided to perform commercial activities or use public funds will put less emphasis on acquiring donations.

Finally, our findings show that NGOs income is determined by demographic and economic factors and that it depends on their financing model, age and philanthropic goals. These results are part of the current debate about the problem of public trust and charitable donations.

Our study has several limitations. Our survey is based on an analysis of revenue and public trust in selected countries; hence, the results cannot be generalised. Moreover, the study aimed to verify the hypothesis concerning the impact of selected factors on NGOs' revenues. It is necessary to conduct research to determine why general public trust does not affect the amount of donations and what elements influence the creation of public trust.

The results of this study extend existing findings and explanations by identifying factors that have an impact on the amount of revenues from donations. Finally, these results may help practitioners manage non-profit organizations to make them more effective in collecting donations.

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Czy zaufanie społeczne wpływa na udzielanie wsparcia finansowego organizacjom pozarządowym?

Celem artykułu jest ustalenie związku między poziomem dochodów organizacji pozarządowych a zaufaniem społecznym do nich. Badanie wykaże, czy zaufanie społeczne mierzone przez Charities Aid Foundation ma wpływ na dochody organizacji pozarządowych z działalności charytatywnej. Analizowane są dochody organizacji pozarządowych w Polsce, Chorwacji oraz Wielkiej Brytanii oraz zmiany w poziomie zaufania społecznego w tych krajach i w dochodach organizacji pozarządowych w latach 2013–2017. Dla realizacji celu badawczego zostały zastosowane takie metody badawcze jak analiza literatury i analiza regresji panelowej. Wyniki analizy regresji panelowej wskazują, że wysokość darowizn zależy nie tylko od poziomu zaufania publicznego, ale także od wielu czynników zewnętrznych. Stwierdzamy, że poziom dochodów organizacji pozarządowych jest różny w zależności od kraju, ze względu na różne poziomy rozwoju gospodarczego tych krajów i ich zamożności. Wyniki pokazują też, że poza obszarem demograficznym, na wysokość przychodów i wysokość darowizn dla organizacji pozarządowych wpływają także cel filantropijny, liczba lat, jakie upłynęły od założenia organizacji (wiek organizacji) oraz model finansowania. Ograniczenia badawcze wynikają z wyboru kilku krajów do analizy. Oryginalność i wartość niniejszego opracowania polega na tym, że problem niskiego zaufania społecznego do organizacji pozarządowych analizowany jest w artykule poprzez powiązanie go z dochodami tych organizacji.

Słowa kluczowe: organizacje pozarządowe, zaufanie społeczne, przychody, darowizny

Appendix 1

Table 4. Issue of Accounting and other legal acts regulating the activity of NGOs in Poland, Croatia and the United Kingdom, 2009–2017

Year	Croatia	Poland	United Kingdom
2009	Monitoring financial data of non-profit organizations as a sector General data on subjects and data relevant for the database of financial reports from the Registry of non-profit organizations become available to the public according to the ordinates of the Law on the right to access information (the exception being so-called small non-profit organizations).		
2010			
2011		Obligation to publish a financial and activity report on the government website.	The definition of a charity was also incorporated into tax law so that charities can obtain tax relief. The Charity Commission has a new public benefit objective, "to promote awareness and understanding of the operation of the public benefit requirement.
2012			
2013			
2014	The new Law on Associations.	Like other entities, NGOs are obliged to fulfil regulations of the Accounting Act. However, they can prepare simplified financial statements if they do not run a business.	The Charities (Exception from Registration) Regulation – charities that do not reach a gross annual income of £100,000 are not required to register with the Charity Commission.

Year	Croatia	Poland	United Kingdom
2015	Coming into force of the Law on Financial Operations and Accountancy of Non-Profit Organisations. Obligation to self-assess financial management and to enforce control. Obligation to make plans for large non-profit organizations. Obligation to create financial reports. All financial reports made public through the Registry of non-profit organizations.	Law on public benefit activity and volunteering – full and simplified activity reports. Some NGOs do not have to prepare financial statements.	Income criterion for audit and the threshold for preparing consolidated (group) accounts.
2016			Charities (Protection and Social Investment) Act 2016 – higher control over charities*. Introduction of SORP FRS (based on IFRS) for first reports in 2019.
2017		Creation of the National Institute of Freedom – Centre of Civil Society Development, which is responsible for the distribution of grants and information on NGOs.	

* https://www.ncvo.org.uk/policy-and-research/charity-law-and-regulation (accessed: 27.10.2020).
Source: own elaboration.