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Social Capital and Economic Development: PLS-SEM Model

Instytucja kapitału społecznego a rozwój gospodarczy: model PLS-SEM

Abstract

The aim of this paper is to measure social capital and determine its effect on economic development across thirty five European economies from 2017 to 2020. Partial least squares structural equation modelling (PLS-SEM) was applied to measure and identify the relationship between latent (directly unobservable) variables. Social trust was found to be more strongly determined by interpersonal trust than by trust in organisations. Furthermore, social trust was also found to be the most important component of the overall measure of social capital. The latent variable representing social interaction and attitudes was found to be less important in the formation of social capital. Finally, a strong positive and statistically significant relationship was found between social capital and economic development.

Keywords:
social capital, PLS-SEM, institutions, economic development

JEL classification codes:
C31, C50, O11, O43, Z13

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Streszczenie

Celem artykułu jest pomiar kapitału społecznego oraz określenie jego oddziaływania na rozwój gospodarczy wybranych gospodarek europejskich w latach 2017–2020. W pracy wykorzystano metodę modelowania równań strukturalnych z wykorzystaniem cząstkowych najmniejszych kwadratów (PLS-SEM), która umożliwia pomiar oraz identyfikację związków pomiędzy zmiennymi ukrytymi (bezpośrednio nieobserwowalnymi). Ustalono, że zaufanie społeczne jest bardziej determinowane przez zaufanie interpersonalne niż przez zaufanie względem organizacji. Ponadto stwierdzono, że zaufanie społeczne jest najważniejszym elementem ogólnej miary kapitału społecznego. Mniej ważnym w formowaniu tej zmiennej okazała się zmienna społecznych interakcji i postaw. Ustalono także, że pomiędzy zmiennymi kapitału społecznego i rozwoju gospodarczego występuje silny dodatni i istotny statystycznie związek.

Słowa kluczowe:
kapitał społeczny, PLS-SEM, instytucje, rozwój gospodarczy

Kody klasyfikacji JEL:
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Introduction

The problem of economic development is one of the most frequently researched macroeconomic topics in modern economics. The search for determinants of this process is still current and relevant. Economic processes in the economy are strongly embedded in culture. Unfortunately, this issue is often overlooked or even ignored by economic theory [**Wilkin, 2016**: 79]. In contemporary analyses of economic development, cultural aspects are usually covered by the *ceteris paribus* clause [**Owczarczuk, 2020**: 78]. Interest in the cultural dimension of economic development occurred mainly through T. B. Veblen, the founder of the "old" institutional school. As the "father" of institutionalism, he focused his attention on informal institutions. He analysed the instincts governing economic processes and highlighted their importance. **Veblen** [**1924**: 101] referred to thought patterns, habits, and customs as institutions.

Economic culture is an important part of the embedded culture of a society. One of its elements is social capital, which is mainly related to interactions between individuals. Social capital is a multidimensional and complex institution. This paper assumes that it consists of trust and propensity for social interaction, which include a willingness to participate in social processes, as well as social attitudes and behavioural patterns. The paper treats social capital as an element of the informal institutional structure.

The purpose of this article is to measure social capital and determine its effect on the economic development of selected European economies from 2017 to 2020. The paper applies partial least squares structural equation modelling (PLS-SEM) as a research method. The PLS-SEM method served the realisation of the objective of the article. The relationship between economic development and social capital was examined for 35 selected European economies from 2017 to 2020. This paper uses data from World Bank statistical databases and the World Value Survey and European Values Study [**EVS/WVS, 2021**].

Literature review

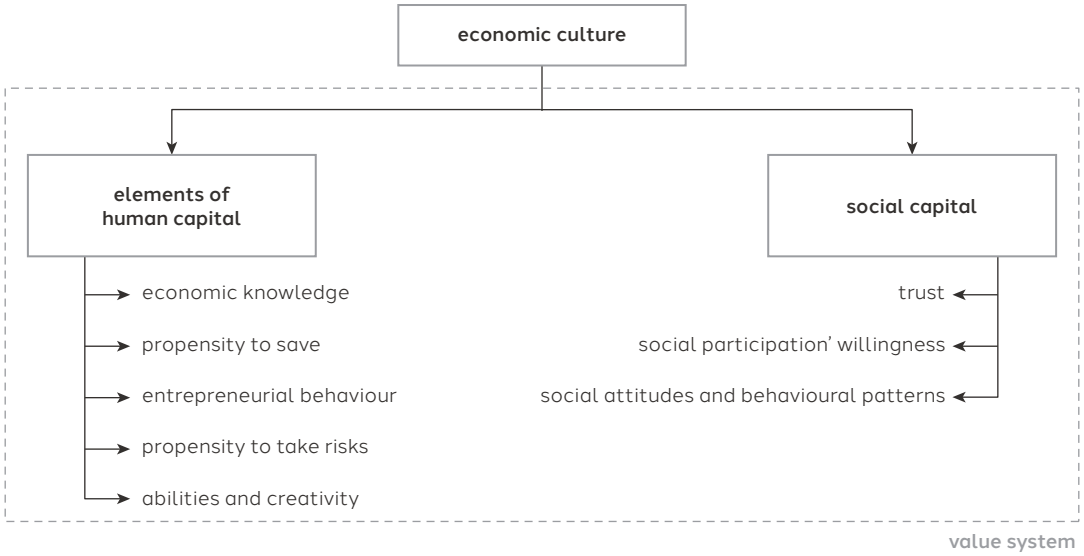
Institutions and economic culture in economic theory

An indispensable element of any economy is the institutional system, which consists of many institutions. Institutions are universal rules, principles, but also customs and thought patterns that influence all interactions of an economic, social and political nature between entities [**Hodgson, 2006**: 18]. They are processes that influence the behaviour of all individuals in the economy. Institutions have an intangible dimension; they cannot be seen; they are invisible [**Ostrom, 2008**: 822]. They are dependent on conditions of the past. While newly created institutions are in perfect alignment with the past, they will never be in line with the present conditions [**Veblen, 2016**: 88]. This is because past experiences are the pattern for their creation.

Institutions operate surrounded by other norms, rules, customs, thus forming the institutional structure of the economy. The institutional system consists of many different, interdependent social norms. This article uses D. C. North's division, according to which the institutional structure consists of two groups of institutions: formal and informal ones [**North, 1994**: 360]. The fundamental difference between formal and informal institutions is how they are created [**Chavance, 2008**: 59–60]. The formation of formal norms is the result of conscious human activity. The task of the introduced formal norms is to organise the most important spheres of social life. Informal institutions arise spontaneously. They are unwritten customs, which have become an inseparable part of human consciousness over time. Their effects themselves occur in the way people behave, and consequently in their decision-making processes [**Wirth et al., 2013**: 21–22]. Strongly embedded in the mentality of society and unwritten in nature, informal institutions are a difficult, and thus rarely addressed, area of research in social literature. Undoubtedly, informal norms are the core of the institutional system. Not only do they determine the directions of the change of the entire institutional system, but also influence the formal institutional environment. They are both a factor and a mechanism limiting the formation and

change of formal rules [**Gruszewska, 2017**: 44]. The change of informal institutions is a slow process. Informal institutions include [**Fiedor, 2015**: 94] culture, the value system, behavioural patterns, religious-spiritual aspects, social trust, and ways of thinking and pursuing truth.

Figure 1. Elements of economic culture



Source: Author's own elaboration.

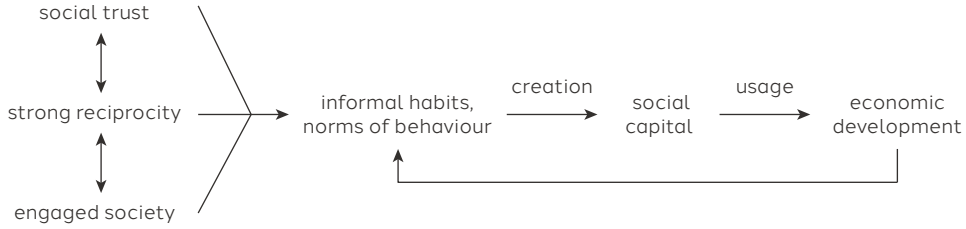
One of the most important elements of the informal institutional environment is economic culture, which is a section of the formed culture of society. It concerns issues related to the attitude of people to economic and financial processes. Economic culture is universal; it is not written down, and the study of its effects is possible only through the observation of behaviour and economic decisions made by people. Moreover, it is deeply rooted in human mentality. It seems that the institution of economic culture (Figure 1) is a combination of selected elements of human and social capital [**Gardocka, 2005**: 233]. Economic knowledge, the propensity to save, entrepreneurial behaviour, as well as the propensity to take risks and creativity are elements of human capital in the broad sense. Meanwhile, trust, willingness to participate in social processes, the behavioural patterns and social attitudes are components of social capital [**Van Deth, 2003**: 83; **Saukani, Ismail, 2019**: 644]. Economic culture operates in the environment of a certain value system, which affects both of its elements. It can be regarded as a set of unwritten social customs that determine the course and effectiveness of economic decisions made by members of society [**Owczarczuk, 2020**: 80–81].

Social capital as an informal institution

Social capital has no single universally accepted definition. It is most often assumed to be a set of customs related to trust and the propensity, as well as reciprocity, to cooperate with other members of society [**Putnam et al., 1994**: 167]. Embedded habits in this regard create shared knowledge that conditions social interactions and stimulates people to act together [**Ostrom, 1999**: 176]. In this article, it is assumed that social capital is a set of social norms connected to interpersonal trust, confidence in organisations (organisational trust), propensity for social participation and social attitudes and behavioural patterns. Social capital refers to trust, care for those close to one another, participate in social life, willingness to live according to prevailing social norms, and sanctioning those who do not follow them [**Bowles, Gintis, 2002**: 419]. The evolution of social capital institution requires the continuous processes of the improvement and enhancement of interpersonal relations based on mutual trust. The formation and accumulation of social capital is a slow and, as noted by **Fukuyama** [**1995**: 11], a complex and multi-aspect process. The interdependent processes of social

trust, commitment, and reciprocity lead to the spontaneous formation of certain norms of behaviour. These norms are the basis of human behaviour and interactions (Figure 2).

Figure 2. Creation and operation of social capital



Source: Author's own elaboration based on [**Portes, Landolt, 2000**: 337; **Weaver, 2018**: 18].

It should be considered whether social capital can be treated as an institution or perhaps the concept is closer to "traditional" physical capital. Admittedly, both physical and social capital require constant investment. Both are subject to the process of depreciation due to misuse and the passage of time. However, there are many more elements that distinguish that these two concepts of capital [**Nooteboom, 2007**: 33]. First, there is no opportunity to invest in social capital to directly improve, for example, trust. It is not possible to directly purchase its elements. Moreover, unlike physical capital, social capital strengthens its value when it is used [**Ostrom, 1999**: 179]. Moreover, it is a social property that can be shared without compromising its value [**Staveren, 2003**: 417]. It seems that social capital is a social institution [**Ostrom, Ahn, 2007**: 16–17] and can be classified as an informal part of the institutional system [**Knowles, 2005**: 23–24].

Social capital, which is an element of economic culture in the broad sense, undoubtedly has an impact on the creation of socioeconomic conditions that allow individuals to be more active in the economy. Its components have an effect on:

- reducing the risk of economic decisions – in an environment where members of society can trust each other, risks are minimised (minimisation of transaction costs); a safe field of interaction allows all individuals to achieve their intended goals [**Fafchamps, Minten, 2002**: 175; **Kaasa, Andriani, 2022**: 48–50; **Sztompka, 2007**: 307–308],
- improving the flow of information in the economy [**Grafton et al., 2004**: 304],
- enhancing the exchange of experience and the acquisition of new knowledge, as well as the expansion of previously acquired knowledge,
- the informal coordination of collective actions – formal rules of a low quality (common property rights) are substituted by social capital [**Knowles, 2005**: 11].

Contemporary research on economic development indicates that an inefficient institutional structure is the source of economic failure in many countries. Social capital is one of the most important elements of the institutional environment. The theory that institutions have an impact on economic processes does not raise much doubt. According to **Rodrik** [**2007**: 154], contemporary research on economic processes should focus on finding an answer to the question of "which institutions matter" most rather than whether they matter at all. Within modern economic theory, institutions, and more specifically their high quality, are considered as a "deep" factor of economic growth and development [**Rodrik et al., 2004**: 133–134]. Together with geographical and international trade factors, institutions are the foundation of economic development. Not only do they affect the dynamics of economic development itself, but also influence other factors [**Bloch, Tang, 2004**: 245]. **Acemoğlu** [**2009**: 114–123] further distinguishes cultural factors, which are part of the informal institutional environment, within the "root causes" of economic development. On this basis, it can be concluded that the study of social capital in the context of the determinants of development of modern economies is an extremely important topic that is still relevant.

Social capital measuring problems

Measuring institutions is extremely challenging. This is mainly due to the lack of developed methods that allow their quality and nature to be measured. The quantification of formal institutions is very difficult [**Voigt, 2012**], thus informal ones are even more difficult to measure. **Voigt** [**2018**: 8–9], based on an extensive analysis of empirical studies of informal institutions, indicates four main reasons for the difficulties in measuring them: 1) informal institutions are unwritten; their lack of formalisation leads to difficulty in observing and researching them; 2) distinguishing informal institutions is very difficult, the effects of institutions have cumulative results – it is often difficult to point to one institution that had an impact on the analysed trend; 3) the operation of some informal institutions for many people is normal; survey respondents can overlook something that seems obvious to them, which, however, leads to the omission of important measurement information; 4) due to the diverse dynamics of change in an informal institutional subsystem, it is impossible to create a universal measurement tool to assess the quality of institutions today and in the future.

The difficulties in quantifying social capital are rooted in at least four aspects [**Łopaciuk-Gonczaryk, 2012**: 7–9]. First, social capital does not have a single, universal, precise definition; the definitional gap leads to a situation in which researchers have a great deal of freedom in determining what is covered by the term. Second, the lack of a single, universally accepted definition of social capital leads to difficulties in operationalisation, so it is necessary to introduce definitional and measurement assumptions. Third, social capital is a multi-dimensional, multi-component phenomenon; a natural consequence of this is the presence in the literature of many classifications of its components. The most common classification is that of *bonding*, *bridging* and *linking* social capital [**Woolcock, 1998**: 156]. However, it is much more common for researchers to identify their own components of analysed capital, which is not an easy task. Fourth, social capital research can be conducted on a micro-, meso- or macroscale. The most difficult to measure is the quality of social capital at the level of society as a whole. This difficulty lies not only in the selection of substantively relevant variables, but mainly in the way in which lower-order social capital is aggregated [**Carrillo, Romaní, 2017**: 60].

In assessing the quality of social capital, various types of surveys are used to find out the values, behaviours, attitudes and preferences of the population [**Engbers et al., 2017**; **Saukani, Ismail, 2019**; **Yaghoubi et al., 2016**]. The analysis of the results of the surveys allows conclusions to be drawn about the level and quality of social capital, or more broadly, culture. In this article, in order to measure social capital at the level of the economy as a whole (at the macro scale), surveys conducted as part of the European Values Study and the World Value Survey [**EVS/WVS, 2021**; **Haerpfer et al., 2020**] for the 2017–2020 period were used. These measures are considered to be reliable even by institutionalists who are usually critical of quantitative measures assessing the quality of institutions [**Voigt, 2018**: 9]. In particular, one can point to the often-cited work of **Tabellini** [**2010**], who used measures developed within the WVS framework to assess the impact of culture on the economic development of Western European regions. Also noteworthy are the works of **Escandon-Barbosa et al.** [**2019**], **Rezaei et al.** [**2020**], and **Sarracino and Mikucka** [**2017**].

Research method – PLS-SEM modelling

Wold [**1980**] is considered to be the founder of structural equation modelling (SEM) using the partial least squares (PLS) approach. Each PLS-SEM model consists of two main elements [**Ciborowski, Skrodzka, 2020**: 1355–1357]: an inner (structural, theoretical) sub-model, which represents relationships between latent variables, and an outer (measurement) sub-model that contains relationships between latent variables and their explanatory indicators. There are two types of relationships in the outer model: weighting and reflective. According to the former, latent structures are the weighted sums of their indicators. Reflective relations determine the strength of the correlation of a latent variable with an explanatory indicator. There are two types of defining explanatory variables in an outer model. Variables can be treated as formative or reflective

[**Rogowski, 1990**: 36–37]. PLS-SEM models, like all structural equation models[1], strongly combine empirical and theoretical aspects [**Skrodzka, 2016**: 283].

PLS-SEM modelling proceeds in three consecutive stages [**Esposito Vinzi et al., 2010**: 49–50; **Hair et al., 2014**: 31; **Lohmöller, 1989**: 30–31]: 1) model specification (inner and outer sub-model specification); 2) estimation and 3) substantive and statistical validation. Substantive verification is based on the evaluation of the model in terms of consistency with existing economic theory and logical assumptions, while statistical verification is based on various types of measures of the quality of estimation. The validation measures and verification criteria are presented in Table 1.

Table 1. PLS-SEM model validation measures and verification criteria

Reflective measurement model – reflective indicators		
Convergent validity	Factor loadings values	≥ 0.400
	p-value (t-Student significance test)	< 0.001
	Average variance extracted (AVE)	≥ 0.500
Internal consistency[2]	Cronbach's alpha (Cb-α)	0.600 ≤ Cb-α ≤ 0.950
	Composite reliability (pc)	0.600 ≤ pc ≤ 0.950
Discriminant validity	Heterotrait monotrait ratio (HTMT)	< 0.900
Formative measurement model – formative indicators		
Convergent validity	Redundancy analysis	≥ 0.700
Collinearity	Variance inflation factor (VIF)	< 5.000
Significance of weights	p-value (t-Student significance test)	< 0.001
Structural model		
Collinearity	Variance inflation factor (VIF)	< 5.000
Explanatory power	Determination coefficient	lack of standard
Predictive power	Value of Stone-Geisser test (S-G)[3]	≥ 0.000
Significance of path coefficient	p-value (t-Student significance test)	< 0.001

Source: Author's own elaboration based on [**Chin, 2010**; **Garson, 2016**: 63–64; **Hair et al., 2014**; **Hair et al., 2019**: 15; **Henseler et al., 2015**; **Rogowski, 1990**].

The model will use higher-order variables that have a reflective-formative relationship with a lower-order variable. The relations between the higher-order and lower-order variables should be interpreted as elements of an external model. In such a situation, the collinearity problem and the significance of structural parameters, i.e. parameters that are weights, are validated [**Sarstedt et al., 2019**: 209]. Higher-order latent constructs are specified by a set of diagnostic variables (zero-order) of the lower-order latent variables with which they are associated [**Becker et al., 2012**: 365]. The applied method of defining higher-order variables was originally proposed by **Wold [1982]**[4].

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1 PLS-SEM is one of two SEM techniques. The other, CB-SEM (covariance-based structural equation modelling), is a much more restrictive method. There is a requirement for a minimum sample size of at least 200 observations or meeting the assumptions of normality of the multivariate distribution of diagnostic variables). In the case of macroeconomic data (European countries researched in the article), CB-SEM is not applicable (see: **Dash and Paul [2021]**). PLS-SEM is referred to as "soft" modelling, which does not require a large population size (minimum sample size in PLS-SEM models is equal to 10 times the number of exogenous variables of the most complex OLS in structural model or formative outer sub-model). Also, individual indicators do not have to meet the assumptions of normality of distribution [**Hair et al., 2017**: 118].

2 The actual level of homogeneity is between Cronbach's alpha and composite reliability.

3 The S-G test value is calculated using a blindfolding procedure. The method assumes covering every L-th value of the explanatory variable and replacing it with a "forecast." The procedure is repeated until each observation is replaced at least once. The number L (distance) is chosen arbitrarily. The distance should be between 5 and 10 [**Chin, 2010**: 680].

4 In the literature, apart from H. Wold's repeated indicator approach, there are at least three other estimation methods of PLS-SEM models of a hierarchical structure: the omitted lower-order latent variables approach [**Noonan, Wold, 1983**], the two-stage estimation approach [**Wetzels et al., 2009**], and the hybrid approach [**Wilson, Henseler, 2007**]. Moreover, an extension of H. Wold's repeated indicator approach can be found in [**Rogowski, 1990**].

To estimate the PLS-SEM model, two packages of the R computing environment were used: semPLS [**Monecke, Leisch, 2012**] and cSEM [**Rademaker, Schuberth, 2022**]. In addition, an Excel spreadsheet and GRETL were used for the calculations. Before the model estimation process, destimulants were transformed into stimulants[5]. This was due to the specifics of the software used in the article. The signs of all external model parameters should be positive to be consistent with theory and assumptions.

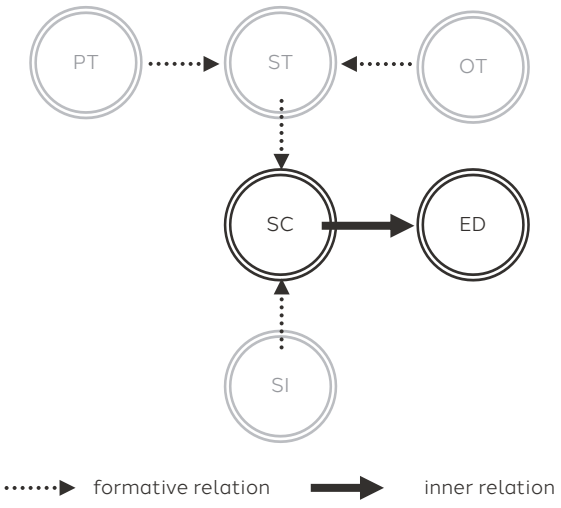
Specification of PLS-SEM model

The use of quantitative methods to analyse qualitative data requires a precise operationalisation of the quality of social capital. Moreover, an important element of research is to identify the elements that make up this institution [**Portes, 2000**]. In this study, social capital (SC) is deconstructed into the following elements:

1. trust (ST), which has been divided into:
   a) trust towards other people (PT) – people in the neighbourhood, people known personally, newly met people, people of a different religion, and people of a different nationality,
   b) trust towards organisations (OT) – confidence in media, police, parliament, government, large companies, and entities of the justice system/courts.
2. propensity for social interaction and social attitudes (SI), which includes: people's participation in social formations (inter alia: cultural, educational, professional and consumer), people's feelings about interpersonal bonds (the importance of friends in life) and attitudes, as well as social behavioural patterns (attitudes towards politics and active participation in economic processes; degree of tolerance of people of other race or nationality).

The scheme of the PLS-SEM model of the dependency between economic development and social capital is presented in Figure 3. The model consists of six latent variables (LVs), four of the first-order (PT – interpersonal trust, OT – trust in organisations, SI – propensity for social interactions and social attitudes, ED – economic development) and one each of the second-order (ST – social trust) and third-order (SC – social capital). The first-order latent variables are defined deductively (reflective indicators). The diagnostic variables (zero-order variables) reflect changes in the latent variable.

Figure 3. Creation and operation of social capital



Source: Author's own elaboration.

[5] Stimulation formula: $x_{ij}^{+} = -x_{ij}^{-}$, where: x_{ij}^{+} is a stimulant and x_{ij}^{-} a destimulant.

The inner model takes the form of a single stochastic equation (1). Economic development (ED), which is a first-order latent variable, depends on social capital (SC) which is a third-order latent variable[6].

$$ED_t = \alpha_1 SC_t + \alpha_2 + \varepsilon_t \quad (1)$$

where: ED_t, SC_t – latent variables (in year t); α_1 – structural parameter of the inner relation; α_2 – location parameter of the inner relation; ε_t – random error with expected value equal to 0.

Table 2 presents the explanatory variables for the various latent structures in the model. The selection of variables was based mainly on factual premises. The presented set of indicators also meets statistical criteria *ex ante* (classical coefficient of variation above 10%) and *ex post* (positively verified SEM-PLS model). The variables related to social capital were created as percentages of those surveyed in the WVS/EVS 2017–2020. The economic development (ED) data was taken from World Bank databases. The PLS-SEM model is cross-sectional; it is estimated on the basis of data for 35 European economies from 2017 to 2020 (average values from this period in the case of economic development indicators[7]).

Table 2. Diagnostic variables of latent constructs in the model applied in this article

Latent variable			Diagnostic variable		s/d*
SC	ST	PT	PT_1	Percentage of people who agreed with the statement: most people can be trusted (%)	s
			PT_2	Percentage of people who trust (complete and somewhat) people in their neighbourhood (%)	s
			PT_3	Percentage of people who trust (complete and somewhat) people that they know personally (%)	s
			PT_4	Percentage of people who do not trust at all newly acquainted people (%)	d
			PT_5	Percentage of people who do not trust at all people of other religion (%)	d
			PT_6	Percentage of people who do not trust at all people of other nationality (%)	d
		OT	OT_1	Percentage of people who expressed confidence (a great deal and quite a lot) in the media (%)	s
			OT_2	Percentage of people who expressed confidence (a great deal and quite a lot) in the police (%)	s
			OT_3	Percentage of people who expressed confidence (a great deal and quite a lot) in the parliament (%)	s
			OT_4	Percentage of people who expressed confidence (a great deal and quite a lot) in the government (%)	s
			OT_5	Percentage of people who expressed confidence (a great deal and quite a lot) in major companies (%)	s
			OT_6	Percentage of people who expressed confidence (a great deal and quite a lot) in the justice system/courts (%)	s
	SI		SI_1	Percentage of people who belong to education, arts, music or other cultural activities organisations (%)	s
			SI_2	Percentage of people who belong to professional associations (%)	s
			SI_3	Percentage of people who belong to consumer organisation (%)	s
			SI_4	Percentage of people who said that friends are completely not important in their lives (%)	d
			SI_5	Percentage of people who are very or quite interested in politics (%)	s
			SI_6	Percentage of people who have signed and wish to sign political petitions (%)	s
			SI_7	Percentage of people who mentioned that they would not like to live in a neighbourhood with people of another race (%)	d
			SI_8	Percentage of people who mentioned that they would not like to live in a neighbourhood with immigrants (%)	d

6 This paper focuses on the impact of social capital on economic development. However, it should be borne in mind that the reverse relationship exists too. Unfortunately, causality is a common problem in SEM models, and should be addressed in an explicit manner.

7 For some variables from a shorter period due to the unavailability of statistical data.

Latent variable	Diagnostic variable		s/d*
ED	ED_1	GDP per capita (constant prices 2010 USD)	s
	ED_2	GDP per employee (constant prices 2017 USD)	s
	ED_3	Agriculture, forestry, fisheries, value added (% of GDP)	d
	ED_4	Services, value added (% of GDP)	s
	ED_5	Employment in agriculture (% of total employment)	d
	ED_6	Employment in services (% of total employment)	s
	ED_7	Infant mortality (per 1 000 live births)	d
	ED_8	Registered unemployment rate (%)	d
	ED_9	Exports of hi-tech products (% of exports)	s

* s – stimulant, d – destimulant

Source: Author's own elaboration.

The personal trust latent variable (PT) is defined by six indicators. PT_1 is a general trust measure, while the other five are related to the degree of trust displayed to selected social groups (neighbourhood – PT_2, people that they know personally – PT_3, newly acquainted people – PT_4, people of other religion – PT_5 and people of other nationality – PT_6). The organisational trust latent variable (OT) was also defined by six diagnostic variables. Each of them represents the confidence of people in selected public (media – OT_1, police – OT_2, parliament – OT_3, government – OT_4 and justice system/courts – OT_6) and private (major companies – OT_5) organisations. Both latent variables (PT and OT) form the social trust latent variable (ST).

The propensity for social interactions and social attitudes latent variable (SI) is specified by eight diagnostic measures. The LV is a representation of at least three components of social capital[8] – social participation (SI_1, SI_2 and SI_3), people's feelings about interpersonal bonds (SI_4), social attitudes and behavioural patterns (SI_5, SI_6, SI_7, and SI_8). Social participation measures are related to the involvement of people in organisations (educational, art, professional and consumer). People's attitudes towards interpersonal links were measured based on their subjective feeling about the importance of friends in life. Meanwhile, social attitudes and behaviour were defined by measures connected to political participation and the degree of social tolerance. The latent variables ST and SI are components of the social capital latent variable (SC).

The economic development latent variable (ED) is defined by nine indicators related to five spheres of development. ED_1 and ED_2 are measures of economic growth, the basic dimension of development. The variables ED_3, ED_4, ED_5 and ED_6 describe the structural aspects of economic development. ED_7 is a health measure. Employment is measured by ED_8. And the last measure, ED_9, is connected to the innovativeness of the economy.

Results of the modelling

Table A1 in the Appendix shows the parameter estimates of the outer sub-model of the model of the dependence of economic development on the quality of social capital for the first-order LVs. All the parameters are statistically significant at the $p < 1\%$ level. The analysed external model is coincident, and the estimates are consistent in sign. The destimulants have been transformed into stimulants, so the signs of their correlations with the latent variables are also positive. Moreover, the indicators were correctly selected for the individual directly unobservable constructs as indicated by the high levels of Cronbach's alpha and the composite reliability index (α-Cb and $pc > 0.700$). Convergent validity was also noted, with all the factor loadings of individual latent variables taking values above 0.400; and the AVE for each latent variable taking

8 The procedure of combining latent variables (components of social capital) was based on statistical considerations. In the model with a larger number of hidden variables there was a problem of collinearity whereby the diagnostic indicators of the directly unobservable social variables – attitudes, behaviours and participation – were too strongly correlated with each other. They contributed similar information to the model, which was why they were aggregated into one latent construct.

values above 0.500. Table A2 presents a measure of discriminant ability – HTMT – for first-order latent variables. The HTMT values indicate that the variables were correctly assigned to the latent structures. The HTMT between the latent variables is below 0.90 (and even below 0.85), indicating that each latent variable that has reflective indicators is a completely different construct. On this basis, the discriminant ability of the external model can be positively verified.

Table 3 presents the estimates and verification criteria of the outer sub-model for social trust (ST), the second-order latent variable. The ST variable is formed by two first-order latent variables: trust towards other people (PT), and trust towards organisations (OT). The calculated variance inflation factors (VIF < 5) indicate that the collinearity problem does not occur. Both exogenous variables have a significant (p < 1%), positive effect on shaping the variability of the endogenous variable. Social trust is significantly more strongly determined by trust towards other people (0.6339) than trust towards entities (0.4794). As it turns out, the foundation of general trust in society is interpersonal trust.

Table 3. External model estimation results for the second-order latent variable (ST)

	weight	t-stat	p-value	95% confidence interval	VIF
Social trust latent variable (ST)					
PT	0.6339	12.8488	0.0000	(0.5657; 0.7548)	1.581
OT	0.4794	12.6602	0.0000	(0.3904; 0.5380)	1.581

* 5,000 samples were used in the bootstrapping procedure

Source: Author's own elaboration.

The outer sub-model estimates for social capital (SC), the third-order latent variable, are presented in Table 4. The weights of the individual elements of social capital (SC), i.e. social trust (ST) and the propensity for social interaction and social attitudes (SI), are different from zero at a significance level of 1%. There is no collinearity problem in the analysed sub-model, as evidenced by the VIF being lower than the critical value of 5. Social capital formation is much more strongly influenced by social trust (0.6690) than by the propensity for social interactions and social attitudes (0.3983). As it turns out, the most important component of social capital is trust. The results seem to be in line with economic theory. Trust, especially interpersonal trust, is the foundation of not only social capital, but also society as a whole.

Table 4. External model estimation results for the third-order latent variable (SC)

	weight	t-stat	p-value	95% confidence interval	VIF
Social capital latent variable (SC)					
ST	0.6690	15.5542	0.0000	(0.5719; 0.7430)	2.199
SI	0.3983	9.2726	0.0000	(0.3256; 0.4923)	2.199

* 5,000 samples were used in the bootstrapping procedure

Source: Author's own elaboration.

Equation (2) presents the estimation of the inner sub-model. The standard errors of the parameters, which were determined using a bootstrapping procedure with 5,000 samples, are shown in brackets. The inner sub-model parameter is significantly different from zero (p < 1%). The Stone-Geisser test values were calculated at 9 blindfolds.

$$\widehat{ED}_{17-20} = 0.8167^{***} \cdot SC_{17-20} + 0.1048 \quad (1)$$

95% CI: (0.7516; 0.8918)

$R^2 = 0.67$ S-G = 0.37

Economic development (ED) is strongly positively (0.8167) affected by the quality of social capital (SC). The variability of the economic development (ED) variable is about 67% explained by the variability of social capital (SC). The model has a good ability to reproduce the observations; the value of the general S-G test is at the level of 0.37. As it turns out, the results of the estimated PLS-SEM model are consistent with the initial assumptions. The presented theoretical aspects of the determination of economic development by social capital are confirmed by empirical data.

Table 5. European countries ranked by SC and ED, 2017–2020

	SC	R	ED	R
Norway	**1.9334**	1.	**1.5200**	1.
Switzerland	1.6205	4.	1.3570	2.
Netherlands	1.3526	7.	1.2867	3.
Iceland	1.5452	5.	1.1662	4.
United Kingdom	0.8380	9.	1.1237	5.
Denmark	1.6479	3.	1.1007	6.
Sweden	1.8830	2.	1.0927	7.
France	0.2653	11.	1.0701	8.
Germany	0.9816	8.	0.8585	9.
Austria	0.7617	10.	0.7918	10.
Cyprus	–0.4984	24.	0.7129	11.
Finland	1.4324	6.	0.6580	12.
Italy	–0.2063	15.	0.4941	13.
Spain	0.1656	12.	0.3438	14.
Czech Republic	–0.5357	25.	0.2495	15.
Estonia	0.0819	13.	0.1452	16.
Portugal	–0.0853	14.	0.0743	17.
Slovenia	–0.2547	17.	0.0371	18.
Lithuania	–0.2809	18.	–0.0413	19.
Hungary	–0.2277	16.	–0.0553	20.
Greece	–1.3086	33.	–0.0814	21.
Slovakia	–0.4498	22.	–0.1910	22.
Croatia	–0.5480	26.	–0.2426	23.
Poland	–0.3627	21.	–0.3046	24.
Russia	–0.8280	28.	–0.3829	25.
Bulgaria	–1.2104	32.	–0.5150	26.
Montenegro	–0.4720	23.	–0.5549	27.
Belarus	–0.3096	19.	–0.9804	28.
Romania	**–1.6521**	35.	–0.9944	29.
Turkey	–0.3105	20.	–1.2561	30.
Serbia	–0.9793	30.	–1.2765	31.
Bosnia and Herzegovina	–1.0144	31.	–1.3629	32.
Ukraine	–0.9387	29.	–1.4838	33.
North Macedonia	–0.5766	27.	–1.6183	34.
Albania	–1.4595	34.	**–2.7407**	35.

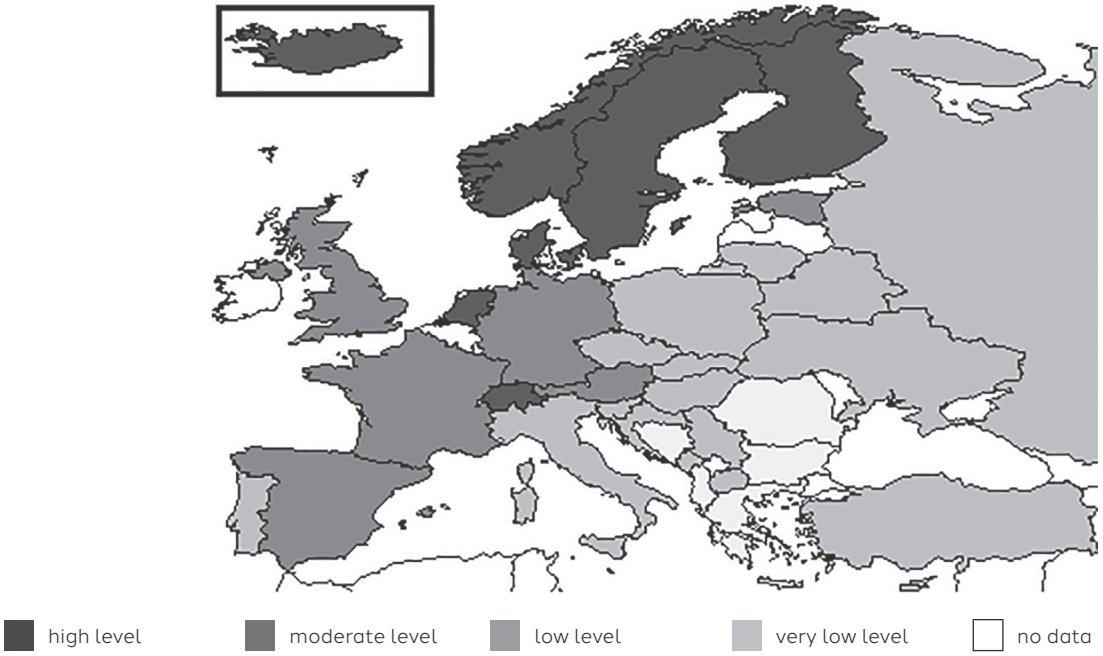
Source: Author's own elaboration.

The PLS-SEM model of the dependence of economic development on social capital is positively verified in terms of both substantial and statistical criteria. The consequence is that the latent variable values can be used for the linear ordering of European countries in terms of the quality of social capital and economic development. Table 5 presents the rankings of European countries in terms of the values of selected latent variables

in the PLS-SEM model for the 2017–2020 period. Countries are divided into four typological groups in terms of the quality of individual directly unobservable phenomena[9].

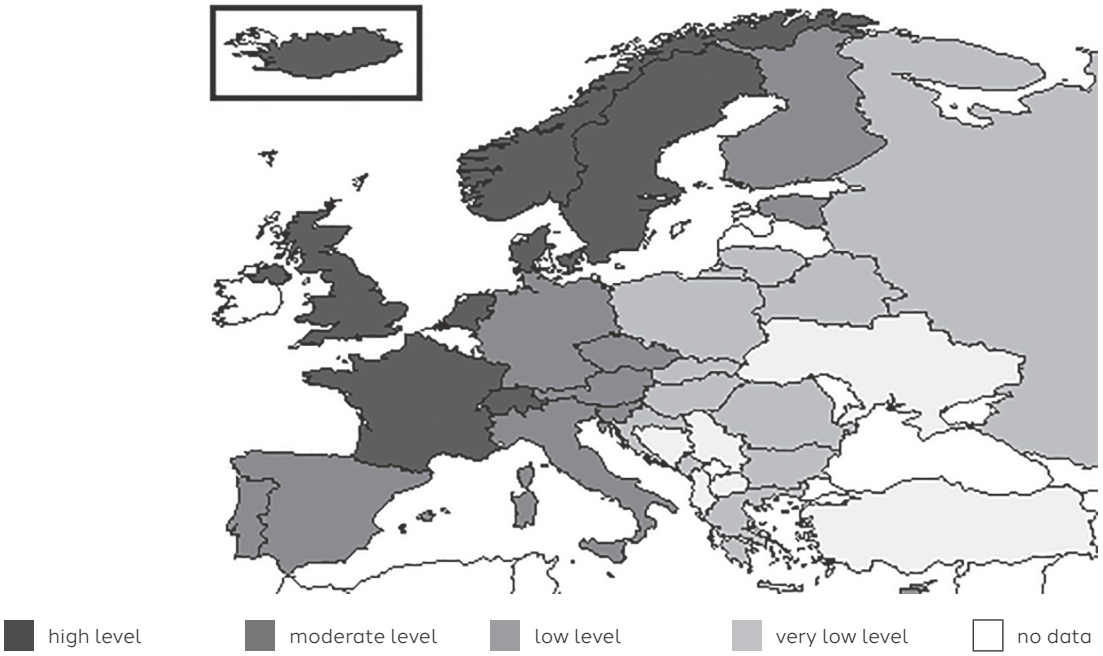
Figure 4 presents European countries ranked by the quality of social capital (SC). The highest level of social capital in 2017–2020 was observed in Norway, while the lowest in Romania.

Figure 4. European countries grouped by quality of social capital (SC)



Source: Author's own elaboration.

Figure 5. European countries grouped by economic development (ED)



Source: Author's own elaboration.

[9] Note that the values of the latent variables are standardised, that is their mean is 0 and their standard deviation is 1 [**Ciborowski, Skrodzka, 2019**: 399].

A high level of social capital was found in the five Nordic countries, the Netherlands and Switzerland, while Germany, the United Kingdom, Austria, France, and Estonia had a moderate level of social capital. The largest typological group is made up of 17 economies with a low level of social capital. Meanwhile, Bosnia and Herzegovina, Greece, Romania, Bulgaria, and Albania form a group of countries with a very low level of social capital.

Figure 5 presents a map showing the diversity of European countries in terms of economic development. The geographical division of development is clearly visible: Western European economies are more developed than those in Eastern Europe. The most developed European country is Norway, while Albania is the least developed. European countries are diversified in terms of not only social capital, but also economic development. It seems that disparities in social capital may be the cause of disparities in development. Undoubtedly, it is possible to see that highly developed countries also have a high level of social capital. The analysis shows that the informal institutional environment is a significant factor in creating conditions for economic development.

Conclusions

The subject of the article was the relationship between social capital and economic development. The aim of the paper was to identify the impact of social capital on economic development and measure these categories. The PLS-SEM model was constructed to achieve the purpose of this article. The article presents a comprehensive model of the dependence of economic development on social capital and a unique novel method for measuring these directly non-observable categories.

First, based on the outer sub-model, it was established that social trust (ST), the second-order latent variable, is determined to the greatest extent by the interpersonal trust variable (PT) rather than the trust towards organisations measure (OT). Second, it was found that the social trust latent variable (ST) is the most important element of social capital (SC), the third-order latent construct. This seems to be in line with the existing economic theory. For example, many researchers use social trust as a proxy of social capital, thereby treating this element as the most important in creating this kind of capital (see: **Coleman** [**1988**], **Francois** [**2003**], **Fukuyama** [**1995**], **Putman et al.** [**1994**], **Sztompka** [**1999**]).

Based on the model's internal relation equation, it was established that the social capital variable (SC) is positively, strongly, and statistically significantly corelated with the economic development latent variable (ED). A number of works can be found in the literature with a similar conclusion (see: **Beugelsdijk et al.,** [**2004**], **Knack, Keefer** [**1997**], **Sabatini** [**2008**]). Some other works confirm the positive relationship between social capital and the various dimensions of economic development, including economic growth (see: **Jantoń-Drozdowska, Majewska** [**2015**], **Whiteley** [**2000**]); innovation (see: **Cáceres-Carrasco et al.** [**2019**]); and human capital (see: **Coleman** [**1988**], **Rupasingha et al.** [**2000**]). In the literature, it is also possible to find studies whose authors conclude that this relationship is not only correlational but also causal. The positive impact of social capital on economic development on the theoretical ground has been identified, among others, by **Ali et al.** [**2011**], **Dinda** [**2008**], **Fedderke et al.** [**1999**], **Lee, Law** [**2017**], **Woolcock** [**1998**]. Therefore, it can be presumed that social capital has a positive impact on creating conditions for economic development.

The quantitative analysis of informal institutions in relation to the process of economic development seems to be an important and ever-present topic. Due to the specific nature of institutions, the study of their impact on economic processes is usually descriptive. Although the model approach does not fit into the canons of institutional economics, especially the "old" school, it is still worth using as a complement to research. However, as **Voigt** [**2013**: 23] notes, in order to be able to better understand and explain the operation of institutions, it is necessary to measure them beforehand. Institutions, as a profound factor of economic growth, influence not only growth itself, but also other dimensions of economic development. Informal institutions, including social capital, are the core element of the entire institutional system, and therefore the study of their operation is relevant and necessary.

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Appendix

Table A1. Estimation results of the external model for first-order latent variables

	factor loading	t-stat	p-value*	95% confidence interval	AVE	Cb-α	pc
Trust in other people (PT)							
PT_1	0.9104	39.7053	0.0000	(0.8630; 0.9523)	0.819	0.956	0.964
PT_2	0.8757	21.0800	0.0000	(0.7826; 0.9418)			
PT_3	0.8474	14.4445	0.0000	(0.7146; 0.9406)			
PT_4	0.9228	34.3176	0.0000	(0.8846; 0.9795)			
PT_5	0.9376	50.3207	0.0000	(0.8953; 0.9683)			
PT_6	0.9322	43.2935	0.0000	(0.8799; 0.9635)			
Trust in organisations (OT)							
OT_1	0.6922	6.4562	0.0000	(0.4413; 0.8576)	0.712	0.917	0.936
OT_2	0.8405	22.0688	0.0000	(0.7537; 0.9046)			
OT_3	0.9439	60.0777	0.0000	(0.9080; 0.9697)			
OT_4	0.8736	25.1546	0.0000	(0.7895; 0.9251)			
OT_5	0.7602	7.1048	0.0000	(0.4857; 0.8962)			
OT_6	0.9228	30.6613	0.0000	(0.8494; 0.9647)			
Social interactions and attitudes (SI)							
SI_1	0.7769	8.7007	0.0000	(0.5821; 0.8922)	0.538	0.873	0.902
SI_2	0.8016	9.7246	0.0000	(0.6094; 0.8913)			
SI_3	0.6500	4.6122	0.0000	(0.3007; 0.8262)			
SI_4	0.5007	4.2016	0.0000	(0.2624; 0.7263)			
SI_5	0.7696	14.6871	0.0000	(0.6620; 0.8626)			
SI_6	0.8417	15.7446	0.0000	(0.7212; 0.9257)			
SI_7	0.7562	8.9095	0.0000	(0.5613; 0.8863)			
SI_8	0.7180	7.4268	0.0000	(0.4966; 0.8656)			
Economic development (ED)							
ED_1	0.8656	37.5956	0.0000	(0.8352; 0.9238)	0.642	0.927	0.940
ED_2	0.8761	23.916	0.0000	(0.7955; 0.9403)			
ED_3	0.8416	22.1138	0.0000	(0.7678; 0.9164)			
ED_4	0.7660	8.9443	0.0000	(0.5627; 0.8878)			
ED_5	0.8743	31.298	0.0000	(0.8147; 0.9253)			
ED_6	0.8949	22.4401	0.0000	(0.7940; 0.9500)			
ED_7	0.7407	8.5352	0.0000	(0.5310; 0.8628)			
ED_8	0.5073	4.2261	0.0000	(0.2441; 0.7114)			
ED_9	0.7698	12.6091	0.0000	(0.6302; 0.8619)			

* 5,000 samples were used in the bootstrapping procedure.

Source: Author's own elaboration.

Table A2. HTMT criterion for first-order latent variables

	PT	OT	SI	ED
PT				
OT	0.619			
SI	0.825	0.534		
ED	0.778	0.580	0.806	

Source: Author's own elaboration.