

Article

Does Social Capital Matter for Total Factor Productivity? Exploratory Evidence from Poland

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Abstract: Two issues connected with sustainable development are analysed in this article: total factor productivity (TFP), which measures the efficiency of transforming physical capital and labour into production, and social capital, which is increasingly considered as a factor of TFP. TFP is sometimes viewed as a measure of sustainability, and its high value indicates an effective way of combining and using limited resources. Social capital, in turn, is a determining factor in the social, economic, and environmental dimensions of development. The subject of this analysis is the impact of social capital on TFP. Social capital generates synergistic effects and creates added value using the existing resources. Therefore, it is legitimate to regard it as one of the determinants of TFP. The role of social capital in sustainable development is theoretically grounded and confirmed by numerous empirical studies. Nevertheless, due to the deep dependence on the context, the mechanisms of the impact of this capital on economic effects are still not fully understood. In this paper, social capital is analysed in the context of the post-transformation economy. This context seems to be interesting for two reasons: the relative weakness of social capital in post-communist countries and extensive nature of development these countries have experienced in recent decades, which together can be a barrier to long-term growth in these economies. The purpose of the paper is to identify and assess the impact of social capital in Poland on TFP in a regional breakdown (Nomenclature of Territorial Units for Statistics II - NUTS II). The research period covers the years 2002–2016 and employs econometric modelling methods. Social capital turns out to be a factor in explaining the level of TFP in Polish regions.

Keywords: total factor productivity; social capital; Poland; trust; growth; sustainability; social networks; regional development; post-communist countries

1. Introduction

The need to shape economic development following the principles of sustainability, meeting the needs of the present without compromising the needs of future generations to meet their own needs [1], is nowadays uncontested among researchers. The issue of utmost necessity is the rational use of limited resources, concern for the effects and side effects of development, and their fair distribution in various dimensions: between communities, societies, or generations. Undoubtedly, the key issue is the search for new solutions increasing the efficiency of using available resources. In this context, one can speak about the sustainability of technology that may be evaluated according to whether it increases productivity, at the same time preserving environmental and other boundaries [2].

In macroeconomics, the concept of total factor productivity (TFP) refers to such an issue. As broadly understood, TFP, unlike productivities of particular production factors, is an aggregate measure of the efficiency of the production process resulting from technical progress [3]. This is, therefore, the part of the increase in production that is not explained by the rise in expenditure of the fundamental growth factors: capital and labour [4]. TFP growth is measured as residual, total output growth less the weighted sum of input growth, the “Solow residual”. Abramowitz [5] called the Solow residual a

“measure of our ignorance” of the growth process. Jorgenson and Griliches [6] suggested that it is a result imprecise of measurement and model mismatch. Despite many improvements, it has still not been eliminated.

A high level of TFP is the key to long-term growth, as an increase in inputs alone cannot sustain production growth due to diminishing marginal returns. TFP is a crucial key to sustainable growth too. K. Arrow et al. [7,8] suggested that TFP plays an essential role in using genuine savings to assess sustainability. They found the contribution of TFP to inclusive wealth growth rate to be between 0.40% (the Middle East/North Africa) and 6.33% (China). TFP is also considered as a measurement of sustainability [9–14].

The most often considered determinants of TFP are technical and technological progress (which is related contemporary to the fourth industrial revolution [15,16]), as well as innovation [17–22], new knowledge creation [23–25], and human capital [24,26–28].

Isaksson [27] groups these factors as follows:

- the creation, transmission, and absorption of knowledge (in particular: R&D, trade, foreign direct investment (FDI), which are a knowledge transfer channel and are necessary for the effective implementation of new technologies);
- factor supply and efficient allocation—human capital, physical infrastructure, physical capital, structural change, and the financial system;
- institutions, integration and policy—(Among others, democracy vs. autocracy, the location of countries and their overall economic development such as per capita income levels and inflation);
- competition, social dimension, and the environment.

Recently, more and more attention is being paid to the soft factors: quality governance, the state of institutions, corruption [29], social conflicts [30], entrepreneurship [31], and hardly perceptible social capital [26,32].

The efforts devoted to the research on the determinants of total factor productivity have been significant for the last decade. However, due to many structural changes in the world economy that have been observed for the previous years, the postulate of Prescott [33] on the need to strengthen the research intensity on the theory of TFP is still valid. This is especially important in the context of a growing role of many intangible and difficult to measure factors, which affect productivity differences between developed countries in a globalised, knowledge-based economy. Research into the relationships between social capital and TFP contributes undoubtedly to filling the research gap. These researches are rarer, also due to the complexity of the phenomenon, such as this capital, its elusiveness, the lack of definitional clarity, and the lack of appropriate measures. Therefore, to address this gap, the economic impact of social capital was first discussed, followed by a brief review of the scarce existing evidence of the effects of social capital on TFP.

Social capital refers to such features of society as trust, norms, and relations, which might increase its efficiency, and facilitate coordinated activities [34]. Its presence means that synergistic effects can be achieved in a community. Additional value can be created through more efficient use of resources, resulting from the effective cooperation of individuals and groups. Social capital may be defined as “the traits characteristic of social life—networks, norms, and trust—which promote cooperation and the coordination of individuals’ efforts towards a common good” [35]. Similarly, Fukuyama [36] defines social capital through the prism of the effectiveness of collective actions and describes it as the ability to cooperate through informal rules and norms between people within a group and organisation in order to realise the interests of members.

Although the concept of social capital is defined in various ways, investigated from different perspectives and measured in a variety of ways, it is seen as being a factor of economic development and even as the “missing link” [37]. It is also worth emphasising that social capital does not always have a positive impact on the economy. In this context, bonding and bridging social capital stand

out, as in the first such distinction made by Putnam [38]. In many studies, this distinction was later used [39–43].

The difference between bonding and bridging social capital relates to the nature of the relationships or associations in the social group or community. Putnam defines bonding social capital as sociological superglue and bridging social capital as a sociological WD-40. Bonding social capital creates strong in-group loyalty, may create strong out-group antagonism and may reduce the inflow of new information, ideas to the group, which may prove to be unfavourable for innovative processes. Bridging social capital (inclusive) is a capital derived from relationships between people who are different due to sociodemographic characteristics, bound by union ties. Bonding social capital (exclusive) comes from close relations and close friends. Bonding is horizontal, among equals within a community, whereas bridging, in addition to the horizontal relationship, also includes the vertical ties between communities; bonding social capital cements only homogenous groups [44]. Robert Putnam discussed that bonding social capital is good for “getting by” and bridging is crucial for “getting ahead” [38]. Although the bonding capital is considered a second-class capital, one cannot unequivocally identify bonding social capital with negative social capital. Whether it has a negative impact depends on the situation and the context in which social capital occurs.

The presented division is one of many. The types are the following: bonding and bridging capital is also added as a “linking”. These relationships are described as “vertical”, and the key feature is differences in social position or power. Moreover, social capital is considered from various theoretical perspectives (neo-Durkheimist, economic, historical-institutional), analysed at different levels (individuals, groups, the macro-level) from multiple aspects (structural, i.e., analysis of networks of relations, normative, i.e., analysis of norms and values and behaviourist, i.e., analysis of observed behaviour). Social capital can be defined using a positive approach (avoiding any normative appraisal) or a normative approach (subjectively, appraising values). It can be treated as an individual good, a common good or a public good). Undoubtedly, social capital is a very complex phenomenon; its operationalisation and measurement are difficult tasks and widely discussed in the literature [45–48]. Among the numerous controversies and allegations, in the context of the subject of the analysis of this article, it should be emphasised that there is an ambiguous distinction between the essence, effects, and causes of this capital. Even the classic arguments and definitions of Putnam are criticised as circular and tautological. According to Portes, “social capital is simultaneously a cause and an outcome. It leads to positive outcomes, such as economic development and less crime, and its existence is inferred from the same outcomes” [49]. It emphasises how difficult it is to capture, measure and evaluate the relationship between social capital and economic effects.

Despite the differences in definitions and interpretations, social capital has been ascribed many benefits, and among others, has been associated with indicators of economic performance, such as productivity [50]. The aggregate-level productivity derives from the productivity of firms. The influence of social capital on productivity can be described as creating a favourable environment for economic performance. Mechanisms by which aggregate outcomes might be achieved are:

- Reducing transaction costs; social norms can work to reduce “transaction costs” by generating expectations, informal rules and shared understandings that allow people to conduct their personal interactions and business dealings efficiently. Reducing transaction costs; thus, it is crucial for the efficient functioning of modern economies [51–53] and the optimisation of the size of an organisation to maximise efficiency [54]. Social capital lowers uncertainty [55,56]. Trust within social networks serves as a substitute for a legal system; for example, in contract monitoring and enforcement. When fewer resources have to be used for securing individuals and firms from theft and other dishonest practices, more resources can be devoted to production and improving technology. This also means that investment decisions can be made using a longer time horizon, and it is possible to invest in riskier, but eventually more productive, projects [57].
- Facilitating the dissemination of information, knowledge and innovations; social capital—foster the diffusion of information and knowledge [58–60], not only among the workers of the same firm,

but also through the professional networks and relationships with friends and former colleagues. In this way, it also helps to use various company resources, including intangible ones, such as intellectual capital [61]. These ties enable to lower the cost and time of information search and exchange, as well as allow to adopt innovations earlier. Hence, in this sense, social capital also contributes to the economy's absorptive capacity, which is very important for productivity [27,57].

- Promoting cooperative and/or socially minded behaviour [56]; several researchers reported that social capital contributes to efficiency by enabling collaboration between individuals with conflicting interests towards the achievement of increased output, and allows more effective use of resources and fair distribution [32,62,63]. Many social norms have evolved to limit self-interested behaviour and to encourage cooperation in such circumstances. Within organisations, a workplace culture of openness and trust can promote cooperation and information sharing among staff, and thereby advance corporate goals. Such a culture may override the narrow self-interest of each staff member, which might be to withhold information from colleagues, who are often potential competitors for promotion or others favoured within that organisation. Networks are claimed to have a synergy effect, bringing together skills and different ideas which may lead to radical breakthroughs, remarkably improving productivity [64]. Social capital enhances productivity and value development in teams through enabling collaboration among the team members using virtual or face-to-face contact [53].
- Personal benefits and associated social spin-offs—evidence from a range of studies suggests that well-connected individuals are more likely to be “hired, housed, healthy and happy” [50,65] than those with few social connections.

Various forms of social capital can be seen as contributing to general issues of collective action, human development, increasing organisational effectiveness, facilitating interunit resource exchange and product innovation, value creation, cross-functional team effectiveness, influencing career success, good supplier relationships, interfirm learning and reducing turnover rates [66–68].

For all these reasons, it is legitimate to perceive social capital as one of the elements determining the total factor productivity, which measures the efficiency of transforming physical capital and labour into production.

Several studies have indicated the existence of relationships between social capital and economic effects. Many of them point to positive relationships [32,69–76], although there are studies that do not confirm this relationship [77,78], or only do so to a limited extent [79]. It is also worth emphasising that social capital does not always have a positive impact on the economy. A negative social effect occurs when it only leads to the redistribution of benefits within a community without increasing the sum of its resources. [49]. This happens when dominating forms of social capital, which restrain individuals, exert pressure to equalise levels for overly ambitious individuals, dominate groups oriented towards pursuing their own interests, even at the expense of the wider community, when intragroup loyalty is built in opposition to strangers.

Additionally, the links between economic effects and social capital are of a two-way nature. On the one hand, the deterioration of the financial situation may contribute to a reduction in the resources of social capital, as in periods of recession, the “amoral familism” described by Banfield is observed [80]. Amoral familism is a reaction to the deteriorating financial situation, poverty, especially in a situation of underdevelopment of state and market institutions, and manifests itself in the emergence of a self-interested, family-centric society, which sacrificed the public good for the sake of nepotism and the immediate family. Economic development can be considered beneficial for social capital, as research shows [81] that the degree of civil freedom is strongly correlated with the level of income per capita, and according to Bilson, it is the economic results that determine these freedoms, and not the other way around. There is also the argument that rich people are more trusting because possible deception by people whom they trusted does not have dramatic (economic) consequences for them. For poor people, such behaviour is more severe. Hence, they are more distrustful [82]. On the other hand, pressure from economic growth in time can act as a hindrance to the strengthening of social networks, due to less

free time. It results in reducing the number of friends, acquaintances and the number of contacts with them. This problem was raised by R. Putnam [38], and the research of Costa and Kahn [83] confirmed his conclusions.

Earlier studies (mainly considering highly developed countries) show the positive impact of social capital on TFP. As emphasised by Dettori, Marrocu, and Paci [26], social capital, together with human capital and technology, constitute the basis of the knowledge economy, which is the best environment for economic growth and development. Their research empirically confirms the relationship between social capital and TFP. The estimated models (for the TFP, data for 199 European regions in 2002) have provided robust evidence on the role played by social capital (as well as by technological and human capital) in enhancing economic growth and social cohesion. This result indicates that a region with a higher level of social participation and cooperation enjoys a higher degree of trust among the members of the community, and this enhances economic efficiency (TFP). Earlier studies for 29 market economies [32] indicated a positive relationship between social capital (trust) and TFP, but not statistically significant. Also, the studies by Jalles and Tevares [24] [24], which analysed the relationship between TFP and social capital in 59 economies in the years 1970–2007, confirm the positive influence of social capital on TFP growth. Their research also shows that the positive effect of social capital is more important in richer countries. Giacinto and Nuzzo [84], by researching Italian regions, also showed that the TFP gap between the Mezzogiorno and the rest of Italy in the manufacturing sector is due to, among others, results from weaker endowment with social institutions. Exciting research results were also obtained by Ng, Ibrahim, and Mirakhor [85]. Their results demonstrated that the impact of stock market liquidity on the gross domestic product and TFP growth is positive and significant only where there is a high level of ethical behaviour in firms. Market liquidity is also significant and positive in promoting growth domestic product (GDP) and TFP growth in cases of high trustworthiness and confidence. The result suggests that the existence of social capital is more critical than the effective regulation and supervision of securities exchanges. Social capital, as a determining factor of TFP, was also considered by Bengoa, Román, and Pérez [17]. Their study indicates that productivity in Spain is affected by differences in absorptive capacities, which were associated with human and social capital. Social capital exerts direct positive impacts on productivity; however, their effects are geographically bounded, and negative spatial spillovers offset direct outcomes role-played spatial distribution of social and human capital, and their geographical externalities are deemed crucial in explaining lower levels of TFP. The capacity of public institutions and private firms to innovate directly and affect productivity gets diminished by the inability to benefit from human and social capital spillovers generated elsewhere.

Results of empirical studies support theoretical explanation relationships between social capital and economic performance (among others, TFP). However, many of the studies concern developed countries; few empirical studies were devoted to the economies of Central and Eastern Europe, which are characterised by a specific economic, social, cultural, and political situation. Jalles and Tavares, Kijek and Kijek, and Ng et al. [24,85,86] analysed TFP's determinants, taking into account post-communist countries. Still, their studies do not concentrate on specific conditions and effects for these economies. Komare [87] investigated TFP's factors for economies of Central Europe, taking into account factor "corruption." However, corruption is only connected with social capital—it cannot be identified with it [88–90].

Research results encourage the verification of the hypothesis about the impact of social capital on TFP in the countries of the former Eastern Bloc. Development of these countries has been somewhat of an extensive nature, and is characterised by relatively low resources of social capital [91]. In Eastern Europe, social capital is usually lower than in Western Europe. It should be noted, however, that post-communist countries are diversified in terms of social capital resources. Adam [92] noticed that the levels of social capital were close to the European average in Slovenia, the Czech Republic, and Slovakia. In contrast, they were much lower in Poland, Hungary, Latvia, Lithuania, Romania, Bulgaria, Russia, and Ukraine. Similarly, the research of Bartkowski and Jasińska-Kania [93] indicates that social involvement was

relatively high, and growing in the Czech Republic and Slovakia; in contrast, in Poland and Hungary, the initially high social engagement of the 1990s declined to the level of the countries belonging to the former Soviet Union. In Baltic states, membership and activity were rather low, although higher than in other former Soviet Union countries.

The results confirm the gap in the stock of social capital between developed Western countries and the formerly communist countries of Central and Eastern Europe. The existence of such a gap was highlighted by Fidrmuc and Gërkhani [94], Paldam and Svendsen [95], as well as Adam et al. [96], who attribute it to the legacy of communism. Low level of social capital may constitute a barrier to long-term, sustainable economic growth [94,95,97–100].

A further study concerns one of the post-communist economies—Poland.

The Polish economy is facing the challenge of overcoming barriers to sustainable socioeconomic development, and one of them is weak social capital. Furthermore, as pointed out in the report prepared for the European Commission [101], Poland is one of the countries representing low-level TFP, a high level of TFP inequalities, and the highest increases of these inequalities during 2006–2013.

The research results contribute to the development of knowledge on the relationship between social capital and economic effects, in this case, TFP. The complexity of this issue indicates that the results of research carried out in highly developed countries cannot be generalised to other groups of countries, especially since social capital is a highly context-dependent phenomenon. The novelty of this work consists in undertaking research in a new object—the post-communist economy, which, so far, has not been the subject of wider analyses.

The objective of this paper was to identify and assess—using econometric modelling techniques for panel data—the impact of social capital on total factor productivity (TFP) in a regional system (NUTS II). The following research questions were formulated in the paper:

- Does social capital affect TFP in Polish regions?
- Which type of capital, bridging or bonding, is good for TFP?

Four hypotheses were formulated:

- H#1: Bridging social capital is one of the factors significantly influencing the level of TFP in Poland.
- H#2: Bonding social capital is one of the factors significantly influencing the level of TFP in Poland.
- H#3: Bridging social capital has a positive effect on TFP levels in Polish regions.
- H#4: Bonding social capital has a negative effect on TFP levels in Polish regions.

It is believed that bridging social capital has a positive effect on TFP, and bonding is negative, as suggested by earlier studies [102,103].

The rest of the article is as follows: the second part presents the data sources, time, spatial range of research, and methods used. The third part describes the results of the study. The next parts contain discussion and conclusions.

2. Methods

In order to address the objectives of the paper, a two-step approach was adopted. In the first step, the aim was to provide a descriptive overview of TFP in Poland in a regional breakdown. Secondly, the subsequent regression analysis aimed to analyse the impact of social capital on TFP. In the sections below, the methodological details of both analyses are outlined. Subsequently, the results of both analyses are presented in the next chapter.

2.1. TFP

TFP may be estimated using two groups of methods. The first of them is the index methods relay on construction aggregate indexes of total productivity (e.g., Laspayres', Paasche's, Fisher's, Törnqvist's, and Malmquist's indexes). The second group relay is on using production function and estimating its parameters (e.g., Cobb–Douglas function, constant elasticity of substitution production

function (CES)). In this paper, to estimate TFP in Polish regions, the classic two-factor Cobb–Douglas production function was used, which was transformed into an efficiency model in the form below:

$$Y_{it} = A_0 e^{gt} K_{it}^\alpha L_{it}^{1-\alpha} \quad (1)$$

where Y —GDP, i —Voivodship number ($i = 1, \dots, 16$), t —Period number ($t = 1, \dots, 15$), K —Physical capital identified with the gross value of fixed assets, L —Number of employed, A_0 —Total productivity of production factors in 2002, g —A rate of technical progress in the sense of Hicks, $\alpha, (1 - \alpha)$ —Production flexibility in relation to capital (labour); $A_0 > 0, g > 0, 0 < \alpha < 1, 0 < 1 - \alpha < 1$.

After dividing both sides of the Equation (1) by the number of employees, we get:

$$y_{it} = A_0 e^{gt} k_{it}^\alpha \quad (2)$$

where y_{it} —means work efficiency (Y_{it}/L_{it}), and k_{it} —technical work equipment (K_{it}/L_{it}), and after logging in the Equation (2), we get:

$$\ln(y_{it}) = \ln A_0 + gt + \alpha \ln(k_{it}) \quad (3)$$

where $\ln A_0 + gt$ means the natural logarithm of the total factor productivity in each region.

In Equation (3), the TFP level is the same for all regions analysed. It would be a significant simplification. Such a model does not take into account the individual effect of individual regions (the same constant term $\ln(A_0)$ for each panel unit). To change the constant for each region, the Equation (3) extends to the relationship:

$$\ln(y_{it}) = \ln(A_0) + \sum_{j=1}^{15} \ln(A_j) w_j + gt + \alpha \ln(k_{it}) \quad (4)$$

where w_j are zero-one variables for subsequent non-base voivodships, $\ln(A_0)$ —Constant in the base voivodship (Mazowieckie), $\ln(A_j)$ —Correction to constant in j -th non-base voivodship [104].

Data on GDP, capital, and labour resources were taken from Statistics Poland (<https://stat.gov.pl/en/>).

2.2. The Impact of Social Capital on TFP—Technique, Data and Variables

In order to estimate the impact of social capital on TFP, a panel data regression model was used. Data for 16 regions and 15 periods (years 2002–2016 the study was conducted in the second half of 2019, then the available data for TFP, social capital from the Statistics Poland database concerned 2016, data from the Social Diagnosis database—2015.) were used. It is supposed that the regression is spurious, and there is the potential simultaneity issue between TFP and social capital. The empirical consequence of endogeneity is biased estimates. For this reason, the instrumental variable (IV) method for panel data was used [105]. IV regression solves a number of econometric problems, one of which is dubbed the problem of endogeneity. Other problems IV regression might solve or mitigate are feedback effects between dependent variables, omitted variable—bias and measurement errors in independent variables. Generally, endogeneity has evolved to mean any situation in which an independent variable is correlated with the regression equation's error term [106–108].

In line with the considerations in the introduction, two different measures were adopted for the analysis: bonding and bridging social capital. It should be taken into account that such a division has limitations and defects. These capitals combine both the structural dimension (relationship networks) and the normative dimension (shared norms, values and beliefs), which is criticised and decreases the use-value of the concept [109]. Moreover, bonding and bridging capital are not mutually exclusive. The division into these types of capital is therefore neither unequivocal nor separable. The general nature of the relationship they represent in the exclusive–inclusive dimension was assumed as the main criterion for recognising an individual variable as bonding or bridging capital.

The original list of potential variables (Table A1, Appendix A) was verified in terms of substantive content and statistical properties (level of variability, correlations between explanatory variables, correlation with the explained variable, missing data). For variables to the model finally adopted, there are complemented existing data gaps in time series. In the analysis, due to the lack of normal distribution of many of the variables, natural logarithms of their values were used. The adopted individual variables from the “social capital” group are widely used in research. They are based on declarations (Social Diagnosis data) and observations (Statistics Poland data), define various aspects of social capital: participation in networks of relationships of a formal nature (e.g., participation in associations, non-profit organisations) and informal (number of friends), beliefs (trust), attitudes (commitment, concern for the common good).

Based on the individual variables, there are created two aggregate variables based on a formula of aggregation standardised variables. They characterise bridging and bonding social capital (Figure 1). Generalised trust, interest in paying taxes, commitment to the common good and the activities of sports clubs were considered inclusive; activities for art and hobby clubs were exclusive. In formulating an aggregate measure of social capital, it was based on the assumption that organisations focused on meeting the needs of the group should be treated as a manifestation of bonding capital, and those that have an externalised mission directed not only at the founders and members—bridging. In empirical research, however, there is no complete agreement on how to classify different groups and activities ultimately. As for the Polish conditions, Janc [102] treats the occurrence of artistic circles and treats interests as a measure of the ability to associate to achieve specific goals. This form of association has different aims than for non-government organizations (NGOs) or foundations. These goals are more focused on realising oneself within a group of people with similar interests. There is less emphasis on the common good, more on self-realisation. Działek [110] adopted a different assumption. Still, the analysis also inclines to the view that interest circles and artistic groups are a manifestation of bonding social capital, and commitment to local communities is not bonding capital. Herbst and Swianiewicz [103] also treated involvement in local communities as a manifestation of bridging capital. In turn, Bartkowski [111] believed that hobby organisations and sports associations, as well as cultural associations, should be treated as bridging associations. However, he recognised that traditional local associations promoting local culture should be treated as bonding associations.

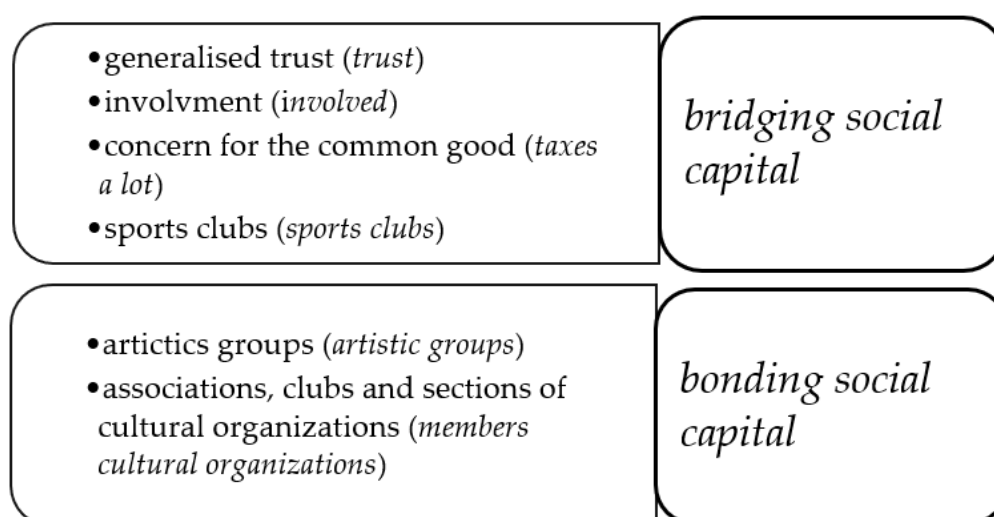


Figure 1. The components of social capital and bridging bonding. Source: own elaboration.

Taking into account all these approaches (in the context of Polish conditions), components of bridging social capital include variables: trust, taxes a lot (as a measure of concern for the common good), involvement, the number of sports clubs per 1000 inhabitants. As a bonding, social capital was recognised: groups’ artistic and club and section membership. Participation in sports clubs was

treated as a component of bridging capital, but also, in this case, the opinions are divided. Membership in sports organisations was considered, according to J. Bartkowski's proposal, as a manifestation of bridging capital. Still, there are reasons to approach this qualification with a certain degree of caution, as the results of the research are not precise [110,112–115]. Due to the nature of sports clubs and the nature of their participants, in this study, they were treated as a manifestation of bridging capital. Sports activities are conducive to health, fitness, but also the development of social relations. Mainly children and adolescents (over 71% of participants) participate in Polish sports clubs and over 56% of participants practice team sports [116]. Sport teaches competition, but also cooperation (especially team sports). Important—in the context of social capital—are the principles promoted in sport—fair play. Promoting these principles among the youngest participants of social life can be considered—in the author's opinion—be compatible with the nature of bridging social capital.

Trust and involvement in local affairs were treated as part of social capital bridging. Trust promotes the flow of information, reduces transaction costs, allows faster penetration of knowledge (also that brought by foreign capital), and serves the general good. Of course, as mentioned, this does not mean that bonding social capital excludes trust, even generalised trust. The existence of a bond involves the existence of the trust. Moreover, groups characterised as bonding are based on very strong trust, especially in “their own”. Involvement in local affairs was considered a manifestation of work for the common good and an expression of civic attitudes. Also, the concern for the common good, shown in response to the question “how much do you care that others pay lower taxes than they should?” was considered a manifestation of bridging social capital. Low consent to avoid taxes indicates that the *free-rider* attitude is not accepted, a kind of commitment to creating the common good; it can make pressure on others, and the creation of certain norms and practices. The lack of acceptance of free-riding behaviour may, as a consequence, contribute to increasing overall efficiency through the existence of public good.

The impact of social capital on TFP was analysed with the use of aggregate measures of bridging and bonding social capital according to Equations (5) and (6). Two different measures of social capital were used instead of a general one, due to the different character of the influence of these types of capital on economic effects.

Aggregate measures were created according to the formula:

$$\text{bridging } sc_{it} = z_{trust_{it}} + z_{involved_{it}} + z_{taxes a lot_{it}} + z_{sports clubs_{it}} \quad (5)$$

$$\text{bonding } sc_{it} = z_{artistic groups_{it}} + z_{members cultural organizations_{it}} \quad (6)$$

where z_{it} is normalised values of variables, calculated according to the formula:

$$z_{it} = \frac{x_{it} - \min\{x_{it}\}}{\max\{x_{it}\} - \min\{x_{it}\}} \quad (7)$$

where: i —Number of regions, t —Number of periods.

3. Results

3.1. Descriptive Analysis of TFP in Poland

Below is presented the level of TFP in Poland in the years 2002–2016, calculated according to the method indicated in Section 2.1. It also presents an analysis of the convergence of Polish regions due to the level of TFP.

As a result of the least-squares estimation of Equation (4), the parameters were obtained. The estimation of the model brought in the following output:

$$\ln \frac{\hat{Y}_{it}}{L_{it}} = \hat{\alpha}_i + 0.030t + 0.371 \ln k_{it} \quad (8)$$

The estimated rate of technical progress under Hicks is 3.0%, and the elasticity of labour productivity concerning the capital–labour ratio is 0.371. All variables are statistically significant at the 5% level, and the fit of the model is satisfactory ($R^2 = 0.973$).

$$TFP_{it} = \frac{y_{it}}{k_{it}^a} \quad (9)$$

where a is the estimated parameter α of Equation (4) (in this case $a = 0.371$).

The estimated values of corrections for the constant $\ln(A_0)$ were negative in all voivodships. The regional diversity of TFP is statistically significant.

The highest TFP level in Poland takes place in the Mazowieckie voivodship; it was also high in the Dolnośląskie, Wielkopolskie, and Śląskie and Pomorskie voivodships. It took the lowest values in the voivodships of Eastern Poland (Lubelskie, Świętokrzyskie, Podlasie, Warmińsko-Mazurskie), as well as slightly higher in the regions with lower socioeconomic potential—Opolskie and Lubuskie (Table 1).

Table 1. TFP in Polish voivodships and its changes in 2002–2016.

Region	TFP 2002	TFP 2016	TFP 2002–2016	The Average Annual Growth of TFP Rate
Dolnośląskie	871.8	1277.0	35.81	2.76%
Kujawsko-pomorskie	723.0	1063.1	32.57	2.79%
Lubelskie	553.2	919.3	41.92	3.69%
Lubuskie	728.6	976.5	22.36	2.11%
Łódzkie	684.7	1087.5	40.99	3.36%
Małopolskie	705.0	1143.0	39.73	3.51%
Mazowieckie	961.1	1544.4	39.38	3.45%
Opolskie	657.1	1020.0	39.46	3.19%
Podkarpackie	643.5	950.6	32.87	2.83%
Podlaskie	611.5	920.3	37.92	2.96%
Pomorskie	826.8	1162.4	29.69	2.46%
Śląskie	900.6	1260.7	27.27	2.43%
Świętokrzyskie	626.2	955.1	38.62	3.06%
Warmińsko-mazurskie	694.0	985.9	34.25	2.54%
Wielkopolskie	805.1	1236.0	38.34	3.11%
Zachodniopomorskie	787.3	1048.6	25.80	2.07%

Source: own computation.

The convergence analysis shows that the hypothesis about the convergence of regions due to the level of TFP cannot be confirmed for Poland. The parameter α_1 in the regression Equation (10) is negative but close to zero, and the relationship itself is not statistically significant; R^2 is also relatively low ($R^2 = 0.114$) (see Table 2, Figure 2).

$$\frac{1}{T}(\ln TFP_{i, 2016} - \ln TFP_{i, 2002}) = \alpha_0 + \alpha_1 \ln TFP_{i, 2002} + \varepsilon_i \quad (10)$$

where $T + 1$ —number of periods.

Table 2. Estimation results of the regression equation describing the dependence of TFP growth on its initial level in Polish regions in 2002–2016.

Parameter	Value	Standard Error	t-Student Statistics	Significance
α_0	0.098	0.051	1.899	0.078
α_1	−0.011	0.008	−1.345	0.200

Source: own computation.

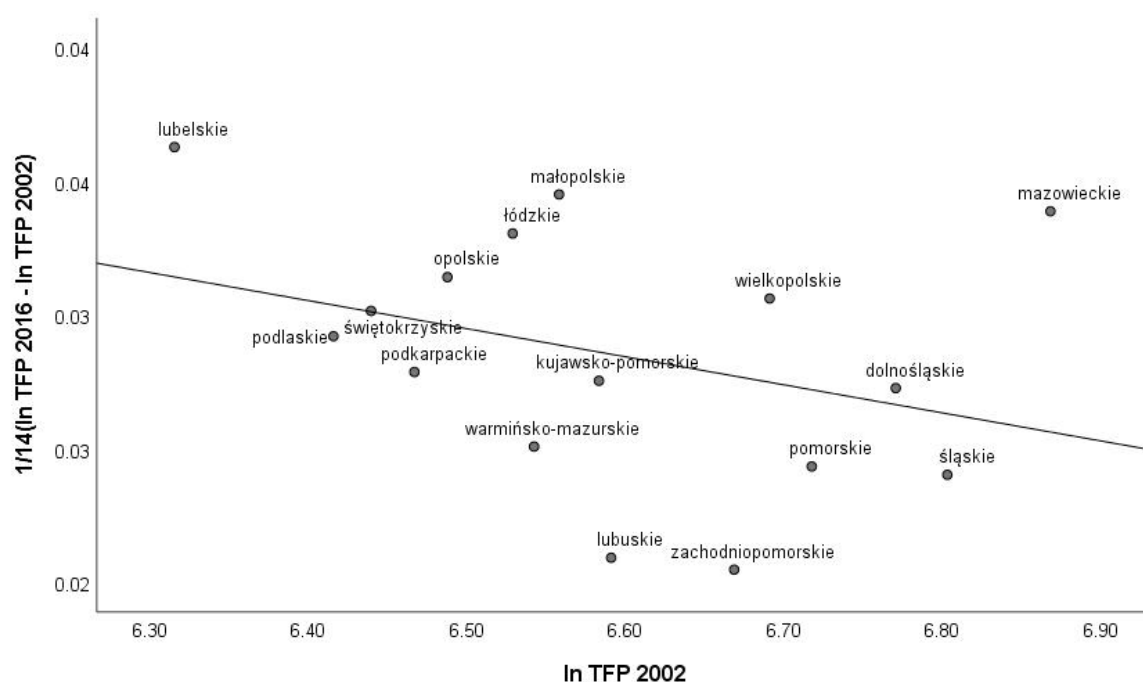


Figure 2. Absolute β —TFP regional convergence in Poland. Source: own elaboration.

3.2. Social Capital in Polish Regions

Aggregated measures of *bonding social capital* and *bridging social capital* were calculated on the basis of the Formulas (5) and (6). Table 3 contains a statistical description of the individual variables used (pooled data for 15 periods and 16 regions).

Table 3. Descriptive statistics of social capital indicators.

Variable	N	Minimum	Maximum	Average	Standard Deviation	Correlation with TFP (r-Pearson)
trust	240	0.040	0.280	0.124	0.034	0.238 ***
involved	240	0.079	0.260	0.147	0.030	0.163 **
taxes a lot	240	0.088	0.236	0.159	0.033	0.433 ***
artistic groups	240	0.229	0.805	0.459	0.110	−0.571 ***
sports clubs	240	0.131	0.622	0.345	0.094	0.080
members cultural organizations	240	0.403	16.181	7.316	3.851	0.596 ***

* Significant at 0.01 probability level, ** Significant at 0.05 probability level, *** Significant at 0.001 probability level. Source: own computation.

Preliminary evidence of the associations between TFP and social capital is illustrated in Figure 3a–h. These figures reveal that the majority of social capital indicators is positively correlated with TFP. These relationships are incredibly visible to *members cultural organisation* and *taxes a lot*. In one case, there is a negative correlation: higher TFP is accompanied by lower numbers of *artistic groups*. These relationships can be of a different nature: both cause–effect and symptomatic. The high level of TFP is probably influenced by the high quality of social capital, but it, in turn, has its origins in the sociodemographic characteristics of the region (the level of economic development, population structure, social features, e.g., entrepreneurship).

The spatial differentiation of bonding and bridging social capital values in Poland in 2016 is presented in Figure 4.

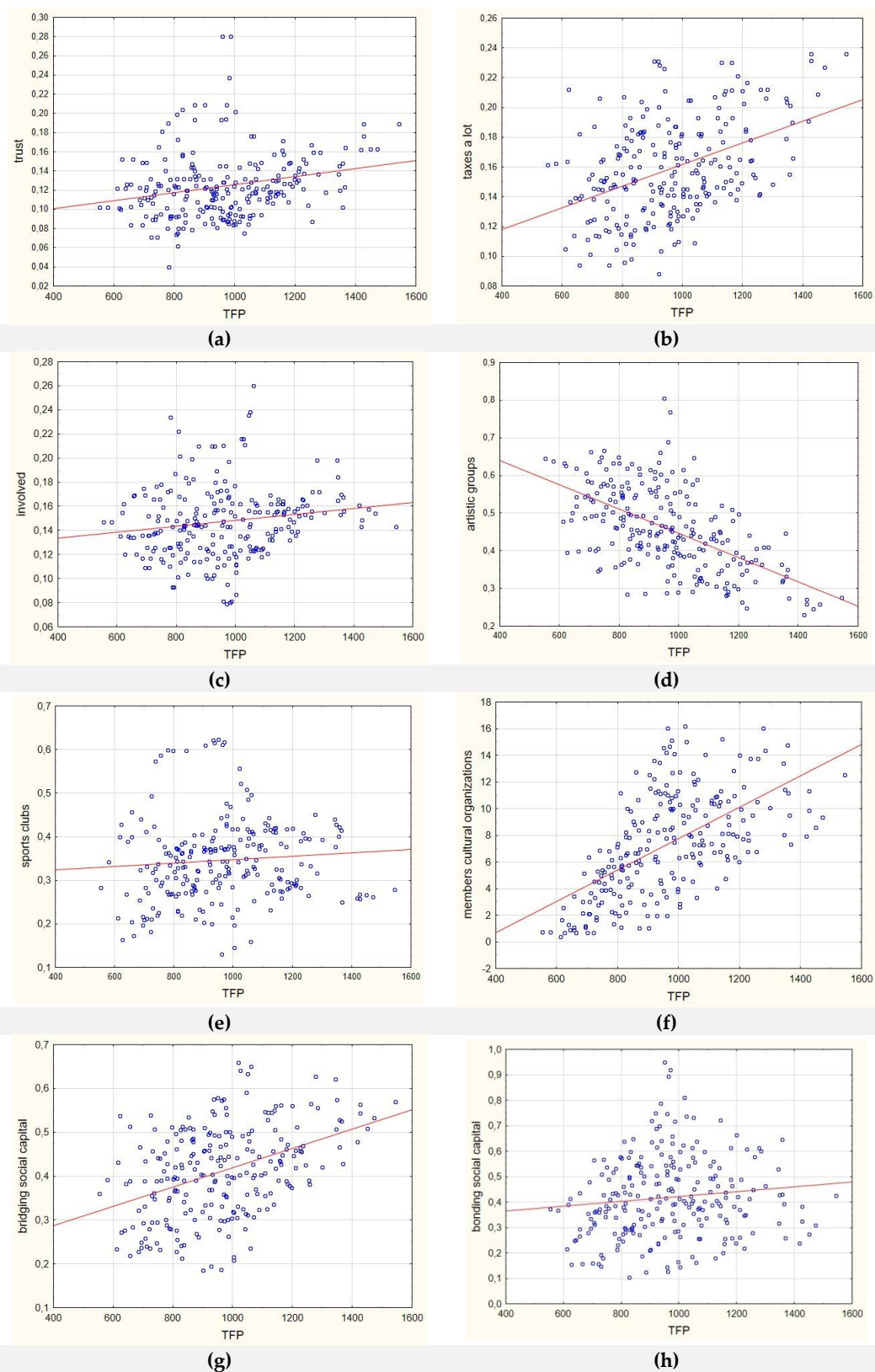


Figure 3. TFP and social capital indicators (pooled data): trust (a), taxes a lot (b), involved (c), artistic groups (d), sports clubs (e), members of cultural organisations (f), bridging social capital (g), bonding social capital (h). Source: own elaboration.

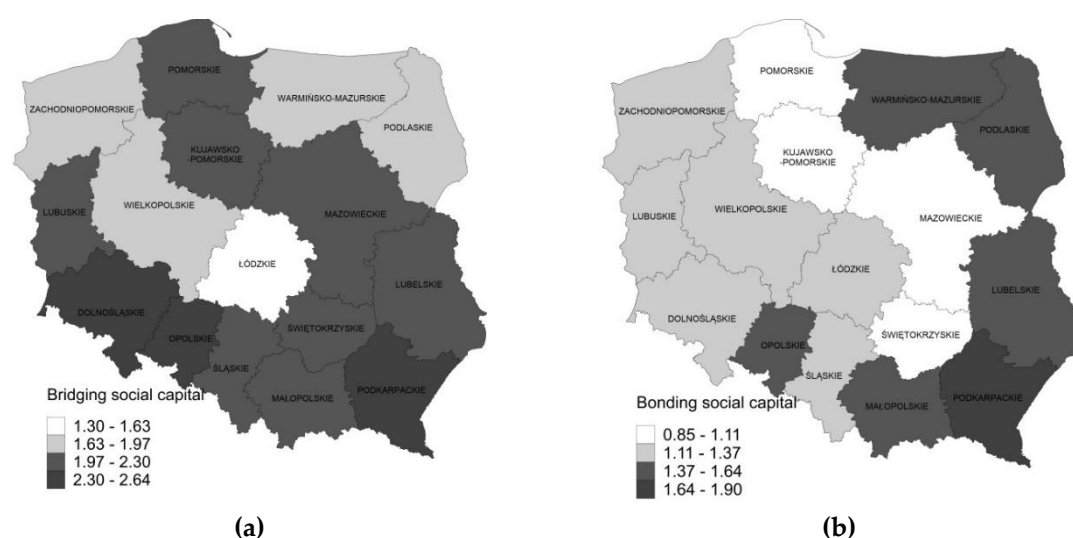


Figure 4. Bridging (a), bonding (b) social capital in Poland in 2016. Source: own computation.

In this model, in addition to social capital, human capital (*education*) and FDI (*employed foreign capital*) are also considered as TFP determinants. The development of human capital and the inflow of knowledge from outside the economy are essential factors in technological progress, expressed by TFP.

3.3. Econometric Analysis of the Impact of Social Capital on TFP

The associations between social capital and TFP can be estimated by regressing the TFP on a set of regressors of two types: social capital (bridging and bonding) and other variables determining the level of TFP. As such, it was assumed: *education*, and the influence of knowledge from abroad (represented by *employed foreign capital*) [117]. Table 4 presents the basic information on the variables adopted for econometric analysis.

Table 4. Descriptive statistics of variables used in the econometric analysis (pooled data).

Variable	N	Minimum	Maximum	Average	Standard Deviation
TFP	240	553.17	1544.41	962.07	194.76
education	240	11.69	41.83	22.98	6.20
employed foreign capital	240	0.01	0.26	0.08	0.05
bridging sc	240	0.74	2.64	1.64	0.41
bonding sc	240	0.21	1.90	0.84	0.32
GDP per capita	240	15,299.00	77,359.00	31,966.50	11,096.07
SME	240	1066.80	2414.80	1510.63	268.33
III sector	240	0.41	0.67	0.54	0.06
non-working	240	20.70	37.00	26.51	3.49

SME—small and medium-size enterprise, standard errors in brackets. Source: own computation.

The basic equation to be estimated is as follows:

$$TFP_{it} = \alpha_0 + \alpha_1 \text{bridging sc}_{it} + \alpha_2 \text{bonding sc}_{it} + \alpha_3 \text{education}_{it} + \alpha_4 \text{employed foreign capital}_{it} + \alpha_i + \varepsilon_{it} \quad (11)$$

where: $i = 1, \dots, 16$, indexes the regions; $t = 1, \dots, 15$, indexes periods, ε_{it} —error term, α_i —constant in time individual for observation i .

Four hypotheses to be tested:

- H#1—whether $\alpha_1 \neq 0$;
- H#2—whether $\alpha_2 \neq 0$;

- H#3—whether $\alpha_1 > 0$;
- H#4—whether $\alpha_2 < 0$

Results of regression estimation are reported in Table 5. Model (1) is a pooled regression model. Hausman's and Brausch-Pagan's tests indicate that GLS is the best estimator (panel model with random effects (model (3)). In this model, all variables are statistically significant. *Bonding social capital* negatively affects TFP levels, while *bridging social capital* positively. Human capital (*education*) and FDI (*employed foreign capital*), as expected, positively and statistically significantly influences the TFP level, when both types of social capital are analysed simultaneously. These estimation results of this model seem to confirm all the hypothesis.

Table 5. TFP and social capital (dependent variable: TFP).

	OLS (1)	FE (2)	GLS (3)	IV (5)	IV (6)
constant	149.380 (73.181)	−65.801 (104.311)	−1.937 (91.181)	564.813 (678.359)	82.171 (406.514)
ln education	418.039 (24.561) ***	432.083 (27.586) ***	427.036 (26.164) ***	385.530 (120.792) ***	371.893 (128.057) ***
ln employed foreign capital	162.810 (8.038) ***	117.890 (20.913) ***	117.890 (16.355) ***	318.697 (187.680) *	165.148 (74.716) **
bridging sc	20.338 (69.627)	181.093 (61.390) ***	174.608 (60.113) ***	1243.15 (465.705) ***	1437.27 (440.647) ***
bonding sc	−85.160 (40.989) **	−132.597 (42.123) ***	−134.224 (40.504) ***	−997.442 (244.716) ***	−958.753 (271.816) ***
Number of regions	16	16	16	16	16
Number of periods	15	15	15	15	15
N	240	240	240	240	240
estimation method	OLS	FE	RE	TSLS FE	2GSLS RE
	R ² = 0.859	LSDV R ² = 0.9503			

* Significant at 0.01 probability level, ** Significant at 0.05 probability level, *** Significant at 0.001 probability level. Standard errors in parentheses (); Instruments: GDP per capita, III sector, SME, non-working. Dependent variable: TFP. Source: Own elaboration.

The statistical associations between TFP and social capital can be affected by reverse causality: social capital is found to be a determinant of TFP, but it is also likely to be affected by it. In order to deal with the problem of endogeneity (simultaneity), the method of instrumental variables was used, although it is not easy to find suitable instruments for social capital at the analysed level of data aggregation and for the adopted research period. Instruments were adopted in the analysis:

- the level of GDP per capita (*GDP per capita*)
- share of employed in sector III (*III sector*)
- level of entrepreneurship (*SME*)
- the age structure of the population—demographic characteristics of inhabitants (*non-working*)

The level of economic development (*GDP per capita*, *III sector*) determines the state of social capital, which was the subject of analyses in the works [38,43,80,82,83]. The quality of social capital is also influenced by demographic characteristics (population structure by age), the quality of human capital, including the level of its entrepreneurship.

When considering the abovementioned instruments (significantly correlated with endogenous variables), regression models with fixed effects (5) and random effects (6) were used. Both of them indicate the significance of the parameters α_1 and α_2 . Bonding social capital negatively affects TFP, while bridging positively affects TFP value.

4. Discussion

The theoretical foundations, previous empirical studies and a preliminary analysis of the correlation between TFP and social capital variables in Poland indicated the legitimacy of a more in-depth analysis of TFP relationships with social capital. The premise for undertaking the research was the simultaneously existing empirical and contextual gap.

Bearing in mind all these reservations as to the limitations of the operationalisation used previously, the results of the analysis show that social capital, both bonding and bridging, are

significant determinants of TFP in Poland in the analysed period and spatial division. Human capital (measured by participation of the economically active with higher education in the economically active total), as well as knowledge and skills acquired from outside the economy (measured by the number of employed in entities with foreign capital), also turned out to be significant factors. This variable is related to human capital, and it represents the openness of the economy that allows the transmission and absorption of knowledge from outside. As expected, *bonding social capital* negatively and *bridging social capital* positively affects TFP level, when both human capital and the inflow of knowledge from abroad are taken into account. Also, in the extended analysis (IV panel regression), taking into account the endogenous nature of social capital variables, all four variables are statistically significant.

The regression results show that human and social capital are those that have an influence on TFP. This indicates the legitimacy of considering both factors in the production function, which is regularly the case for human capital, and less frequently for social capital. At the same time, the results of the study indicate the legitimacy of separate consideration of social capital of a different type, since their impact on efficiency has another direction.

The results regarding human capital are consistent with other previous studies [17,26,28,118,119], including those concerning Poland [120]. The research by Ciołek and Brodzicki, in which the impact of human capital in spatial models on growth TFP was analysed, resulted in less explicit conclusions. While the increase in human capital positively contributed to TFP growth in Polish poviats in 2003–2013, its level was correlated negatively with an increase in TFP [121].

Bridging social capital, which is an aggregate of measures of trust, commitment, participation in inclusive organisations (sports clubs) and concern for the common good, has a positive effect on TFP. Such a set of characteristics of community conducive to lowering transaction costs reduces the risk management, increases the rate and scope of the flow of information, knowledge, promotes flexibility, promotes cooperation giving synergistic effects, and helps to effectively combine the available factors of production, which has a positive impact on the value of TFP.

On the other hand, organisations of an exclusive nature (interest clubs and especially artistic groups) negatively affect the overall productivity of the factors of production. Artistic groups—in these studies—include, in particular, theatrical, music-instrumental, vocal and choir groups, folklore, and dance groups. The bonds in these groups are strong, deep, personal, and the involvement of the members is great. Relationships of this type may limit the influx of new ideas into society, weaken overambitious individuals and inhibit the development of new relationships conducive to social progress. Social capital bonding can distort market mechanisms, reduce innovation, delay change and reduce flexibility, and can therefore lower TFP.

Bridging social capital turns out to be positively, statistically significantly linked to TFP in Poland; in turn, bonding social capital has a negative statistically significant effect on TFP. Hypotheses 1–4 can be considered supported.

The negative impact of bonding social capital on the level of TFP may also be one of the reasons for the lack of TFP convergence of Polish regions. High bonding social capital resources are observed in more impoverished regions (and with a lower TFP level), and in some of them, at the same time, a low level of bridging capital. Although in poor areas, TFP has increased relatively more than in prosperous regions, the convergence process has not been confirmed. Moreover, in absolute terms, TFP growth was the highest in affluent regions, the lowest in poor regions, the absolute difference between rich and poor is steadily growing. One of the reasons for this may be still undeveloped or not fully used social capital supporting cooperation, openness to new ideas and knowledge.

It should also be considered that, in more impoverished regions, a low level of bridge capital, and a relatively high level of bonding capital, may be a consequence of the low prosperity of these regions, and not its cause. It should be considered and further investigated whether the bonding social capital in poor regions is not good for “getting by” as per Putnam. However, this does not exclude that the influence of social capital on TFP is statistically significant, which was confirmed by the results of the analysis using instrumental variables.

Earlier studies, taking into account the impact of social capital on TFP, mostly indicated its positive impact. Although various measures of this capital were adopted (e.g., economic association membership in the handicraft and commerce sectors; index, which reflects the role of cooperation and confidence in achieving social and economic outcomes; corruption perception index; voluntary service, unions, and cultural associations meetings; ethical behaviour of firms; trust; ethnic, linguistic, religious fractionalisation, civil liberties, participation, country latitude; voting; newspaper readership; civic associations; credibility), in most papers a positive impact was observed, e.g., in DiGiacinto and Nuzzo [84], Bengoa, Román, and Pérez [17], Dettori, Marrocu, and Paci [26], Ng, Ibrahim, and Mirakhor, [85], Jalles and Tavares [24], Salinas-Jiménez and Salinas-Jiménez [29], Markowska-Przybyła [122]. In the researches of Knack and Keefer [32] and Komare [87], this effect was positive but not statistically significant; in the Lyon's [123] study—ambiguous, and in Helliwell's research [77], the impact was negative.

This research indicates that, in Poland, the impact of social capital on TFP is statistically significant. However, some elements of social capital have a negative effect on TFP, which has so far been rarely observed. The reason for this is also the fact that earlier works (on the impact of social capital on TFP) do not consider separately bonding and bridging social capital, as has been done in this paper.

The regularities observed in highly developed economies were also confirmed for a country with a post-transformation economy, such as Poland. The importance of social capital for efficiency turns out to be significant in this part of Europe. This conclusion seems to be particularly important in view of the relatively low resources of this capital. Supporting the development of social capital (in the form of bridging capital) is a way of increasing efficiency and, at the same time, supporting sustainable development. The social capital of the bonding type, which may constitute a barrier to development, should be subjected to a more in-depth analysis.

The research partially fills the empirical and contextual gap identified in the introduction. The results encourage further, more profound and expanded research: the deepening requires analysis of individual components of social capital, their nature and impact on economic performance; extensions—the spatial extent of the investigation, enabling comparative analysis with other countries. It should also be considered whether the relationships between TFP and the density of organisations are not only symptomatic and whether there is no inverse relationship here, e.g., the number of sports clubs is not the result of a higher level of development.

At the international level, we do not yet directly observe the effects of a possible barrier to long-term productivity growth. In the EU, we observe TFP convergence processes at the country level and a relatively significant increase in the Polish TFP [24,101,124–126]. However, at the regional level in Poland, this convergence is not observed. The explanation for this situation may be the fact of the existence of some barriers in poor regions, which are unable to learn and adapt solutions developed in more advanced areas quickly enough. One of these barriers may still be undeveloped or not fully used social capital supporting cooperation, openness to new ideas, and knowledge.

Understanding the causes of this phenomenon requires further in-depth research, including verification of the hypothesis of the negative impact of bonding social capital. An undoubted recommendation for economic policy is taking care of social capital in Poland—it is capital that is easily eroded, and its reconstruction is arduous and long-lasting. Building an environment of trust (or at least not destroying it), to fellow citizens, as well as to institutions, seems to be a timeless matter independent of space, but particularly crucial in poor regions. The further development of democracy is critical because, as noted by Fidrmuc and Gërzhani [94], the causal relationship runs from democracy to social capital. It is essential to build “bridges” that can be the pathways for new knowledge, thoughts, and contacts needed for further growth. It is also crucial to promote cooperation, especially for the common good and the spirit of entrepreneurship and tolerance, including openness to new ideas. Low resources of social capital are not an insurmountable obstacle. As Sarracino and Mikucka pointed out [127], there is no evidence of “social capital poverty trap”; this is good news

for countries with historically low stocks of social capital (such as Eastern and Southern European countries) as they are not doomed to low growth rates of social capital.

After a dozen or so years of the systemic transformation-political system in Europe, a convergence in formal institutions between the old and the new member states has, in no small extent, been accomplished. Nevertheless, there remains a mismatch between these “harmonised” formal institutions and the existing informal institutions in the new member countries. Findings of Fidmurek and Gërxhani [94] show that the participation in Olsonian groups () is much lower than in Putnamesque groups (such as education, sports and arts clubs, religious and charitable organisations, and youth and hobby groups) in the new member countries, reflecting the individuals’ lack of trust in formal institutions.

More recent studies analysing the period 1990–2012 indicate that the trends of participation in groups and associations consistently decreased in many post-communist countries. Still, this change was the effect of a systemic transformation. Such organisations in communist regimes were often bureaucratic institutions controlled by the state. Thus, counting them among the sources of social capital may be seen as applying Western definitions to Eastern reality [127]. Negative trends are observed in Central-Southern Europe and, to some extent, also in Central-Eastern Europe for trust in others, index of civic cooperation, confidence in religious institutions (only in Central-Eastern Europe), confidence in political institutions, and confidence in public services, armed forces and police too. Poland recorded declines in all the analysed indicators of social capital. It was in the group of countries with the highest falls in terms of confidence in religious institutions, public services, and political institutions [127].

These trends are most probably related to historic conditions. As Hofstede noted, having an autocratic or military regime, the experience of occupation and low national wealth are associated with significant authority distance [128]. Many theorists point out that the legacy of Marxist–Leninist indoctrination may hamper the growth of civil society in post-communist societies [129,130]. As Rose [131] noted, the communist system “encouraged people to create informal networks as protection against the state and to circumvent or subvert its commands” [132].

Research on social capital in post-communist countries has put forward a so-called dictatorship theory of missing social capital [94,95,99,133]. According to this theory, dictatorships destroy social capital. Moreover, they create conditions whereby, when dictatorships collapse, societies may even accumulate “negative” social capital, which, in turn, impedes economic growth [134].

Diagnosis of the resources of social capital, learning the ways of its impact and the appropriate policy of supporting its construction and strengthening turns out to be one of the paths to sustainable development. The impact of this capital on the total productivity of factors of production, presented in this paper, is one of many ways.

Currently, although it is still too early to draw far-reaching conclusions, there are reasons to believe that the COVID-19 pandemic will bring new knowledge about social capital and additional challenges for economic policy. The first studies indicate that social capital is significant for the spread of the epidemic [135–138], but also for coping with its effects [139,140].

The effects of the COVID 19 epidemic on social capital have not yet been recognised, but undoubtedly social isolation, stress, loss of income, and the loss of trust in rulers and fellow citizens in many countries will have consequences. It can emphasise the fragility of this capital or, on the contrary, indicate that this capital remains the most durable of the capitals. The research aimed at finding answers to these questions is undoubtedly very desirable.

In the context of the results of the above research, in the author’s opinion, further research is needed, especially on the impact of bonding capital on efficiency, as well as extending the analysis of the effect of social capital on TFP to other countries of Central and Eastern Europe and comparing the results with Western European countries.

However, even though the analysis is insufficiently sophisticated (the issue of time lags or the issue of spatial connections (geographical proximity) was not analysed), its results allow shedding light on what determines the level of TFP in Poland. The complexity of the problem—described in

the introduction—the ambiguity of the concept and the limited availability of statistical data made it necessary to adopt simplifications

There are also some limitations of the analyses performed. The first one has already been mentioned at the beginning and concerns the imperfections of the operationalisation of the bridging and bonding social capital. Other limitations relate to the availability of statistical data and the research methods used. As for the first point, the analysis carried out cannot be extended to subsequent periods or to other countries and regions. The available broad set of variables characterising social capital is available only in the presented scope and would have to be changed. The data used in the “Socia Diagnosis” concern only Poland and the last study was carried out in 2015; similarly, the data used from Statistics of Poland are collected mainly for national purposes. An additional limitation is a fact that data are not available on an annual basis and require estimation for econometric analysis. The international analysis would require the use of Eurostat resources, European Social Survey, World Values Survey, where data are often collected only at the national level. In turn, the limitations of the research method used to result from the difficulties in finding right instruments (in the instrumental variables method used) at the adopted data aggregation level and for the adopted research period.

5. Conclusions

Sustainable development is a development that uses resources as efficiently as possible so that it is a long-term development of an intensive nature. TFP is one measure of resource efficiency. Social capital is more and more often considered in the context of sustainable development and has significant connections with it, in social, environmental, and economic terms. In the economic dimension, it is justified to consider it as a TFP factor.

The research results contribute to the development of knowledge on the relationship between social capital and economic effects, in this case, TFP. The complexity of this issue indicates that the results of research carried out for highly developed countries cannot be generalised to other groups of countries, especially since social capital is a highly context-dependent phenomenon. The novelty of this work consists in undertaking research in a new object—the post-communist economy, which so far has not been the subject of wider analyses.

The paper analyses the impact of social capital on TFP in Polish regions in 2002–2016 recognising that:

- social capital is an essential factor of productivity;
- the context of the post-transformation economy is vital in the case of a culturally, socially and politically conditioned factor;
- this context is still hardly recognised;
- although it may be crucial for further long-term economic growth.

This is the first work containing such analysis, which allows filling the existing research gap, especially the empirical and contextual ones. In the paper, with the use of econometric modelling techniques, the impact of social capital on TFP was estimated, taking into account also other variables. The panel data regression model was used, as well as instrumental variables regression for panel data.

The objective of this paper was to identify and assess the impact of social capital on total factor productivity (TFP) in a regional system (NUTS II). Research results indicate that social capital—both bridging and bonding—is one of the factors significantly influencing the level of TFP in Poland. The bridging social capital is good for the level of TFP in Polish regions, and the bonding social capital—bad.

The research results indicate that as in the economies of Western Europe, also in Poland, social capital—although its resources are low—is important for economic efficiency. Moreover, not all of its forms have a positive effect on efficiency. The results of these studies may be of interest to other post-communist countries, which seek to improve the economic efficiency, due to greater similarities to the Polish economy than to the economies of Western Europe.

Further research should concern the extension of the research subject (to a larger number of economies) and comparative analysis with the economies of Western Europe. Research into individual forms of social capital, and their impact on economic efficiency requires deepening. It would also be advisable to get to know the factors influencing social capital in post-communist countries, because, as previous research shows, they may have various origins, both historical and cultural.

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Appendix A

Table A1. The list of used variables.

Variable	Description	Unit of Measurement	Source	Available for:
TFP	Total factor productivity	-	Own calculation based on data from Statistics Poland	2000–2016
trust	generalised trust	the percentage of positive answers to the question: “can most people be trusted?” (1 = “most people can be trusted”)	Social Diagnosis	Every two years from 2003 to 2015
involved	commitment	the percentage of positive answers to the question: “Did you get involved in the local community this year?” (1 = “yes”)	Social Diagnosis	2000 and every two years from 2003 to 2015
taxes a lot	concern for the common good	participation of the answer “a lot” to the question “How much do you care that someone pays taxes less than they should?” (4 = “I care a lot”)	Social Diagnosis	Every two years from 2005 to 2015
artistic groups	artistic groups per 1000 inhabitants	number per 1000 inhabitants	Statistics Poland	2007, 2009, 2011–2016
sports clubs	sports clubs per 1000 inhabitants	number per 1000 inhabitants	Statistics Poland	2000–2002 and 2004–2016 and every two years
members cultural organisations	Members of associations, clubs and sections of cultural organisations per 1000 inhabitants	number per 1000 inhabitants	Statistics Poland	2007, 2009, 2011–2016
education	Participation of the economically active with higher education in the economically active total	percentage	Statistics Poland	2000–2016
non-working	Number of people in non-working age per 100 people in working age	percentage	Statistics Poland	2002–2016
employed foreign capital	Number of persons employed in entities with foreign capital per 100 total employees	number per 100 employees	Statistics Poland	2003–2016
SME	The number of SMEs per 1000 people of working age	number per 1000 people of working age	Statistics Poland	2005–2016
III sector	Share of employed in sector III	percentage	Statistics Poland	2000–2016

Note: Social Diagnosis data are averages for regions using weights for a panel sample. Source: own elaboration.

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