Article

Regional Social Capital and Economic Growth: Exploratory Evidence from Testing the Virtuous Spiral vs. Vicious Cycle Model for Greece

Irene Daskalopoulou [1],* and **Athanasia Karakitsiou** [2]

1   Department of Economics, University of Peloponnese, 22100 Tripoli, Greece
2   Department of Business Administration, International Hellenic University, 62124 Serres, Greece;
    karakitsiou@teiser.gr
*   Correspondence: daskal@uop.gr

check for
updates

Abstract: The aim of the present study is to analyze social capital as a spatial resource that regions might use differently in their developmental process. We propose a theoretical framework in order to identify the different regional social capital workings as leading to either an open system of relations (the virtuous social capital—development spiral) or to a rather closed system of relations (the vicious social capital—development cycle). At the empirical level, we test the presence of these two developmental paths by two operational hypotheses that are tested through the development and use of appropriate entropy technique for order of preference by similarity to ideal solution (TOPSIS) techniques. Our analysis involves an inclusive theorization of social capital as composed of trust, norms/values, and networks. Using individual and aggregate level economic indicators, we obtain different rankings of the Greek regions compared to the initial entropy weights rankings. Overall, our results provide support to the presence of both developmental paths in the case of Greece while the Greek regions might be categorized as dynamic, stagnant, and unstable.

Keywords: social capital; spatial analysis; multi-criteria analysis; ranking methods; TOPSIS; entropy

1. Introduction

Social capital is widely acknowledged as a multidimensional leverage that might assist societies in achieving highly desirable socio-economic outcomes such as growth, health, happiness, etc. (see indicatively, [1–7]). Economic research has largely focused upon identifying the essence of this particular form of 'capital' as articulated in market transactions and the production of value in societies [1,8]. This strand of research has verified the workings of social capital as a productive resource, in as far as socio-cultural features such as trust, networks, and norms/values, are linked to the economic growth and welfare of societies [1–4,8–10]. In view of that, a social capital accumulation process evolved as the step forward that economies should necessarily undertake. Nevertheless, the complexity that is inherent in the origins, types, and articulation of social capital has made it clear that we lack easy to adopt social capital growth policies [11].

A core issue, and perhaps one of the least researched issues in the field, refers to the regional level of social capital identification and its different contextual workings. Following a micro-to-macro aggregation principle, research has been divided into two largely separated strands aiming at identifying, on the one hand, the key individual determinants, manifestations, and workings of social capital [12–14]. On the other hand, at the aggregate level of analysis, emphasis has been placed on the establishment, enforcement, and the diffusion of rules and institutions that would most likely lead to a culture of cooperation [15–17]. In this context, knowledge on regional social capital is derived

rather implicitly as reflecting either the locus of operation of the group that is studied, or a distinctive national culture that is on average 'embraced' by people and thus typical of a society and of its institutions, rules and sanctions, monitoring system, etc. [18,19]. Nonetheless, social capital is linked to regional heterogeneity and thus further research is needed in terms of its manifestations and workings at the regional level. Recent evidence verifies that need. Analyzing the effect of social capital on local development processes in the European periphery Pisani et al. [20] suggest that social capital contributes to the observed heterogeneity in regional socio-economic outcomes while they call social capital as still being a 'black box'.

Within this context, the analysis of social capital as having a regional dimension is the aim of the present study. In particular, we propose a theoretical model of identifying different regional patterns in terms of social capital accumulation and use. In line with recent theorizations and evidence suggesting that we should bring the micro and macro level of social capital analysis together [21], here we develop a regional social capital–economic growth model and test for its presence and explanatory power via a case study analysis. Our main assumption is that regions have their own social capital dynamic capabilities that emerge at the interface between the individual (micro) and the aggregate (here the regional) levels of analysis. We suggest that we might measure these capabilities as individually held, but contextually formed, social capital levels. In turn, these capabilities are responsible for the establishment of either a virtuous social capital–development spiral or a vicious social capital–development cycle. In other words, we assume that these capabilities actually reflect the regional social capital patterns that have gradually evolved in different peripheries. In the event that regions are open to growth and change, the regional stock of social capital, as built at the intersection of micro initiatives with the wider macro environment, leads to a virtuous social capital–development spiral. In contrast, in the case where regions are closed groups, we might say that they sustain a stock of social capital that reproduces a stagnant development model (vicious social capital–development cycle). We empirically test for the possible presence of the two different patterns by means of the virtuous social capital–development spiral and the vicious social capital–development cycle, hypotheses.

At the methodological level, our analysis relies on the multicriteria analysis. Multicriteria analysis (MCA) encompasses a number of techniques that aim to evaluate a set of alternatives on the basis of multiple criteria. This is relevant here since, in line with the available knowledge in the field [1–4,8–10], we adopt an inclusive operational definition of social capital that entails three main constructs (level 1 criteria, namely trust, networks, and norms/values), and nine items (level 2 criteria, namely generalized trust, institutional trust, ethics, aspirations, cultural rules, formal and latent political participation, associational activity and activism). The technique for order of preference by similarity to ideal solution (TOPSIS) is one of the leading multi-criteria decision-analysis methods mainly due to its ability to rank alternatives based on their shortest distance to the positive-ideal solution and the longest distance to the negative ideal solution. The positive-ideal solution is a hypothetical solution for which all the criteria values correspond to the best criteria values in the data and the negative-ideal solution is a hypothetical solution for which all the criteria values correspond to the worst criteria values in the data. In addition, the method is able to limit the subjectivity introduced by decision makers bringing it down mainly to the stage of determining the weights of the criteria [22]. Based on these two assets of the TOPSIS, we concluded that it can serve as the methodological tool in order to check the study's hypotheses. Further, and in order to limit effects of human subjective judgments, we modified the method by incorporating the entropy weighting technique for the social capital metrics weighting. By doing so, we allow the ranking of the regions under study to be based only to the scores they achieve on the social capital metrics and not on the opinion of a decision maker. In particular, using such a method, we might test for the validity of our hypotheses without imposing any assumptions as to the underlying process of social capital transformation into growth and welfare. In addition, the proposed entropy-TOPSIS methodology denotes the relevant importance of criteria based on the dataset information thus allowing for all data variability to be observed and accounted for. With regard to our model hypotheses, the method used allows us to compare the original data estimations with the

ones encompassing micro-level and macro-level-effect indicators thus giving us an informative picture of the interrelationships analyzed here.

Our analysis uses two-period data for Greece, which are detailed enough so as to allow for the empirical investigation of the study's aim. In particular, individual level data are drawn from the European Social Surveys Round 1 (2002) and Round 4 (2008) datasets, which provide information on the three social capital constructs (criteria) namely, (a) trust, (b) norms and values, and (c) networks and associations, at the regional level (10 Greek regions, NUTS II). In addition, we use these datasets to extract individual income satisfaction levels, which are used here as our micro-level effect indicator. The macro-level-effect indicator refers to regional per capita GDP levels, and the corresponding data are drawn from the Hellenic Statistical Authority. The empirical analysis is performed in two steps. First, we use the entropy-TOPSIS in order to rank the regions of Greece in terms of their stock of social capital and identify possible regional differences in that stocks. At the second level, we again perform the method on the data incorporating the effects of micro and macro indicators in order to identify the micro and macro effects on regional social capital levels.

The study makes a twofold contribution. First, we propose an informative theoretical model as regards the relationship between social capital and development at the regional level. Second, we provide an empirical model of identifying different regional development patterns, which is easy to use in a comparative context. With the proposed model, the analysis of social capital as entailing regional specific dynamics might be used in order to measure a region's distance from a country's best performance region and thus a guide of possible best practices might be discerned from within a given national setting. In addition, it is important to note that with the proposed model, distances can be measured not only in terms of income generation and allocation, but also in terms of other welfare indicators as well. Other critical welfare indicators such as subjective wellbeing, health, safety, etc., can be measured as interacting with regional social capital levels. As such, our model is a useful tool to provide empirical evidence from other regions while in the presence of up-to date detailed data it can also be used for policy analysis, design, and implementation. To that extent, our empirical investigation results provide a useful comparison base with future evidence regarding Greece.

The paper is structured in five sections. Following this introductory section, Section 2 is devoted to a presentation of our proposed model and the description of the hypotheses that might be used to empirically operationalize it and test its validity. Section 3 briefly describes our methodological tool and the data and variables that we use in the analysis. Section 4 presents the results of our study. Section 5 concludes our analysis with main findings, implications, and suggestions for further research.

2. Theoretical Context: Model and Hypotheses

Before we proceed with the discussion of our proposed model it is important to briefly present the notion of social capital and the way it is approximated in the context of the present study. There exists a large body of studies dedicated to identifying the constructs that compose social capital [23–27]. In view of that knowledge, we might suggest that trust, norms and values, and networks form the three building blocks of social capital. The trust component is a key social feature that underlies the everyday life and the transactions of individuals. In that sense, we ought to distinguish the trust component as referring to generalized trust and to institutional trust. Generalized trust is an abstract form of trust that is ascribed to unknown others in a society [28] while institutional trust, is knowledge-based trust, i.e., trust that is dependent on the perceived efficacy of a country's institutions [17,26,29]. Both types of trust are critical to the extent that they facilitate cooperation among individuals and the effective pursuit of common goals [3,15,16].

The norms component of social capital refers to values that reflect common understandings regarding the expected behavior of individuals in a given society, which are 'monitored' and enforced via formal and informal systems of rules and sanctions [27,30]. Group homogeneity in terms of morale involves a code of ethics and behavior in terms of actions and exchanges (e.g., tolerance, voluntarism, and so on), which are meant to improve the wellbeing of individuals, their feeling of

safety and sense of belonging, etc. [23,27,30]. A clear benefit to people and the society emerges from a sense of confidence and positive expectations with regard to the future and the opportunities for various types of exchanges between individuals [31–33]. Finally, networking at the individual level is expected to enhance the desirable outcomes of the actions that a person has undertaken. Lin [34] codifies the expected benefit in terms of (1) information flows, which are facilitated in the presence of a network, (2) influence, exerted on the decision-making agents, (3) social credentials, assuming a person's accessibility to resources, and (4) social relations that ascribe identity to a person and recognition by the group/community. According to Lin (p. 31, [34]), *'these four elements […] may explain why social capital works in instrumental and expressive actions not accounted for by forms of personal capital such as economic capital or human capital'*.

Under the premise that social capital leads to qualitative, i.e., efficient, institutions, aggregate cross-country analyses have focused on tracing those societal features that make up a modern national culture and one that sustains positive growth rates (intelligent societies) [15,16,35–37]. In this context, the case of regions has been rather overlooked under the assumption of a linear relationship originating from individually held cultural identities and reflected into the national culture. To that extent, the regional aspect of the social capital phenomenon is one of the least researched issues despite that social capital is an integral part of territorial capital and an important mechanism for achieving regional developmental goals. Evidence from different strands of research suggest that social capital is a phenomenon that can indeed appear in multiple regimes following a country's specific socio-cultural relations and associational forms [3,38–40]. Indicative are the results of Leigh [41] who studies national heterogeneity in terms of different types of trust and the factors that are conducive to each of them. Using Australian social survey data, he differentiates between 'localized trust' (local level trust) and 'generalized trust' (national level trust) and reports that at the neighborhood level, trust is higher in affluent areas, and lower in ethnically and linguistically heterogeneous communities [41]. Pichler and Wallace [42] provide evidence of important differences in the types and stocks of territorial social capital suggesting that the various cultures of participation that exist in developed countries can be linked to different social capital regimes.

Systematic evidence on the spatial dimension of social capital has been provided primarily by (a) the sustainable urban living and (b) the community development strands of research [43–50]. Community empowerment and regeneration research provide us with some valuable knowledge regarding the spatial character of social capital [51,52]. It is reported that locally embedded associations, partnerships, and other types of formal and informal initiatives can be built and sustain well-functioning communities [43,45,46]. Lochner, Kawachi, and Kennedy [53] study the relationship of social capital and important community characteristics such as collective efficacy, psychological sense of community, neighborhood cohesion, and community competence and report that social capital is different when analyzed as a community feature compared to its analysis as an individual characteristic. Similarly, Stone [44] analyzes the effects of social capital in family and community life in Australia and suggests that public policies should be informed of the existence and content of such effects. Mohnen et al. [54] find that neighborhood social capital is positively associated with residents' health in urban areas. Kitchen, et al. [55] report a positive relationship between social capital actions (volunteering and voting) and health while they also find a positive relationship between social capital and the socio-economic status of neighborhoods in Ontario.

An equally important finding relates to the role of social capital as the basis of urban movements, demanding grassroots empowerment and citizen participation, i.e., a more democratic mode of governance [43,45,46,56,57]. In most developed countries, regions develop towards increased autonomy, a feature that allows them to largely form their developmental goals and the paths followed in order to meet that goals [58]. As a result, a special interaction between the citizens of a region and the state emerge and reinforce attitudes and policies towards the survival of the region and the reproduction of its institutional basis. Finally, empirical evidence show that linking social capital can play a positive role in establishing trust and relations between the civil society and a municipality [59]. Indeed, social capital

is an integral part of the territorial capital that regions and localities might mobilize towards addressing their wider social, economic, and developmental challenges [60–68]. Indicative is the study of Falk and Kilpatrick [69] who analyze the interactive productivity of social capital between the local networks of a community. As they suggest, social capital exists if and only if it can be produced and they identify the area of social capital accumulation as one referring to the accumulation of knowledge and identity resources that people in a community draw together in order to achieve their common purposes [69]. In addition, they suggest that the micro-level interactions that do generate social capital should be analyzed as phenomena embedded in a meso and macro social order, and the links of such embeddedness need to be identified and analyzed [69].

In view of the above, we propose here that social capital is a feature and resource that regions might use in order to sustain or promote their developmental path, the latter depending on the interaction between social capital and other regional features such as socio-economic, demographic, geomorphology, political features, etc. Despite that various developmental paths might be realised, the direction of regional growth might sustain either a virtuous spiral, that aims at expanding the spiral itself (i.e., growth and expansion of the regional economy, Figure 1), or a vicious cycle, that either survives or expands, at the cost of the other groups of the society (economic backwardness, Figure 2). We assume regions to be the meso level of interactions between the micro and macro forces that underlie the formation of the virtuous spiral (rather open system) or the vicious cycle (rather closed system) model of development.
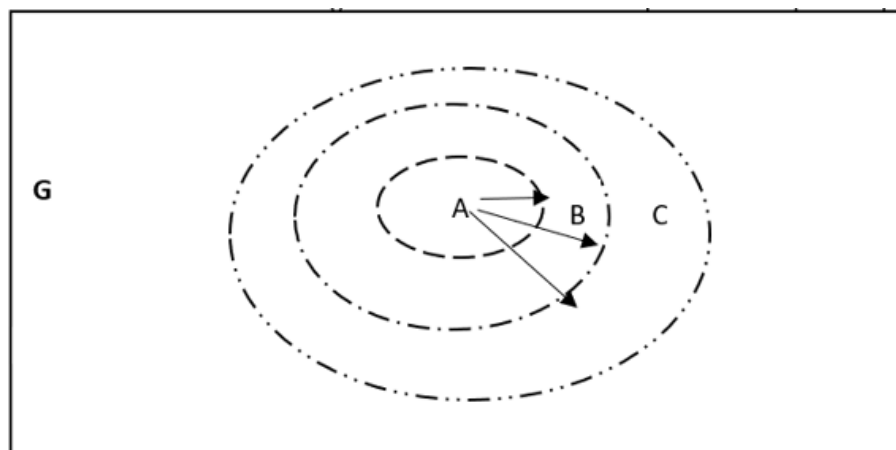

Figure 1. A virtuous social capital–development spiral. Source: Authors' elaborations. Note: Interspersed lines are used to indicate open micro, regional, and macro systems of social capital accumulation and use.
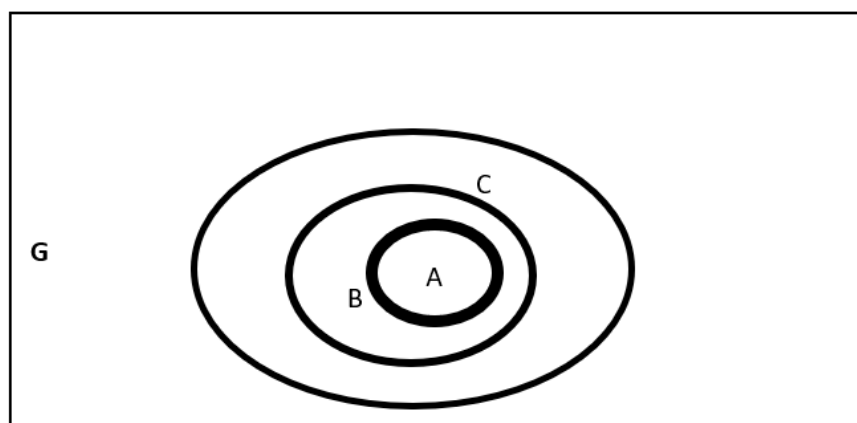

Figure 2. A vicious social capital–development cycle. Source: Authors' elaborations. Note: Continuous lines are used to indicate closed micro, regional, and macro systems of social capital accumulation and use. The lower the level the thicker the lines (boundaries of the group).

The following statements are used here as a description of the virtuous spiral and the vicious cycle models of the interrelationship between regional social capital and development:

Statement 1. *A virtuous spiral will assume the presence of social capital that decreases a person's distance from his/her micro environment (A), the group's distance from the outer bound of the region (B), and, the distance of the group from the national outer bound (C).*

Statement 2. *A vicious cycle will assume the presence of social capital that 'establishes' at the regional level as the meso level of interaction between the individual and the state and can be discerned by the presence of persistent boundaries between the individual (A), the region (B) and the country (C).*

As mentioned earlier, we identify social capital as composed by three building blocks, namely trust, norms/values, and networks. In acknowledging the self-reinforcing character of each one of, and between, these social capital features, we argue here that a region's stock of social capital might have either positive or negative growth effects and that a factor that might help us decide as to the workings of regional social capital is the degree of 'alignment' between micro and macro trends as observed in each region. In that sense, a virtuous spiral is an open system that grows by means of the dynamic cause and effect relationship between the various dimensions of social capital and the ways that these interact with community growth. On the other hand, social capital also lies at the core of closed groups and systems that resist change and/or diffusion of their 'secured' benefits to other groups that might have similar interests and/or to the rest of the society. A relevant analytical approach is used by Van Der Gaag and Snijders [70] who develop a theory-based resource generator to analyze the productivity and goal specificity of social capital. Similarly, Mayer and Rankin [51] study the mobilization of social capital and its success in achieving integration and the sustainable evolution of communities and suggest that failure to do so results into the creation of ghetto economies that reproduce pre-existing welfare inequalities. Habersetzer et al. [71] and Daskalopoulou and Petrou [72] report the importance of open local and extra-local networks for the economic success of regions through the success of local firms. Similarly, Trigkas et al. [73] report the importance of trust for the promotion of the social economy developmental alternatives in the rural areas of the EU. In a rather exploratory study, Daskalopoulou and Karakitsiou [74] use analytic hierarchy process (AHP) techniques in order to rank the Greek regions in terms of social capital types and levels. They provide interesting findings in that they do report differences between regions in terms of their overall stock of social capital and of its composition. The potentially different workings of these stocks of social capital as a growth mechanism are analyzed here by the proposed theoretical and methodological context of the study. Using part of their primary findings, we combine their estimated social capital stock levels [74] with regional growth levels to provide a picture of the social capital–growth relationship in the 10 Greek regions. This is a useful comparison as they employ the same operational definition of social capital constructs and items as the one used here. Figures 3 and 4 provide an illustrative picture of the differences in social capital levels/types and growth among the 10 Greek regions for the years 2002 and 2008. In addition, it is interesting that during that time, a changing pattern of the social capital–growth relationship is observed in the case of almost all regions. This is an interesting finding and one that merits further research and explanation as to how and why it might be observed. This is the aim of the present study.

In view of the above, our contribution lies in the development of a theoretical context from within which to discern the potential origins and discuss the implications of our findings. At the methodological level we test for the analytical validity of a set of operational hypotheses via an appropriate, easy-to-use, and robust multi-criteria method of analysis. In line with the available knowledge in the field, we expect different types of social capital to exert different effects on the behavior of individuals and produce different economic outcomes at the aggregate level. Indicative are the findings of Whiteley [75] who reports the strongly positive effect of social capital on growth and Hjerppe [76] who points to the role that not only trust, but also the structural (participation activity) and cognitive (norms, attitudes) components of social capital, exert on economic growth.

At the regional level, in particular, indicative are the findings of Kaasa [77] who analyzes the effect that different dimensions of social capital have upon innovation activity in European countries. To that extent, it is relevant to analyze the social capital–regional growth relationship in the case of the Greek regions as well and provide further evidence in the long standing and very critical issue of regional disparities in the Greek periphery [78–80].
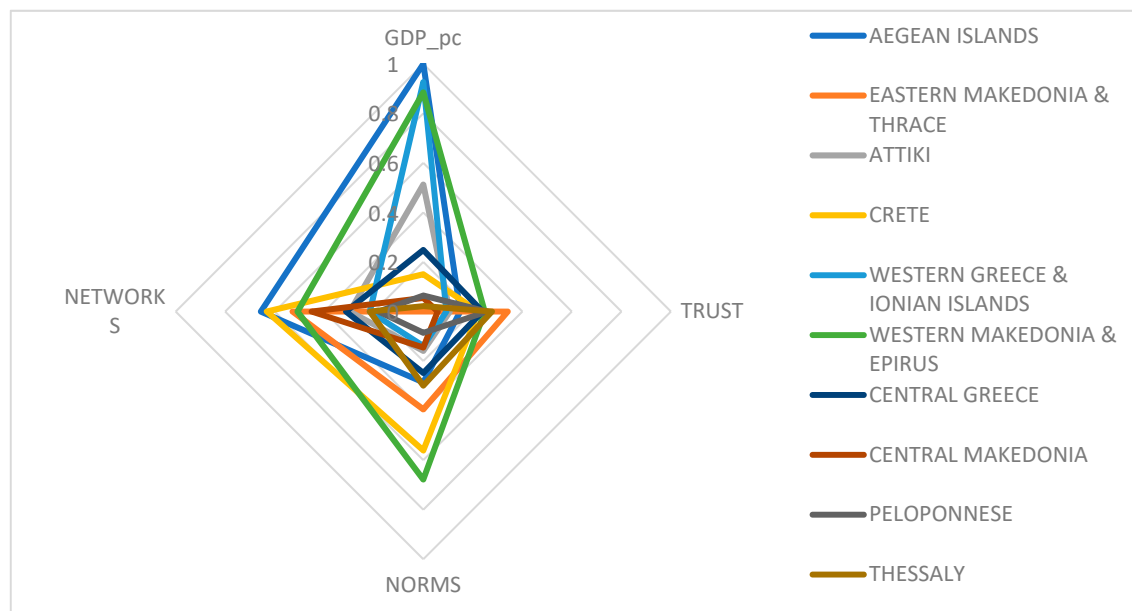

Figure 3. Social capital scores and per capita GDP in 10 Greek regions, 2002. Source: Authors' elaborations of Daskalopoulou and Karakitsiou [74] AHP scores and HSA data. Note: Per capita GDP has been normalized on a 0–1 scale. The region of Aegean Islands presents the maximum score (1) and the region of Eastern Makedonia and Thrace presents the minimum (0) per capita GDP score.

Figure 4. Social capital scores and per capita GDP in 10 Greek regions, 2008. Source: Authors' elaborations of Daskalopoulou and Karakitsiou [74] AHP scores and HSA data. Note: Per capita GDP has been normalized on a 0–1 scale. Again, the region of Aegean Islands presents the maximum score (1) and the region of Eastern Makedonia and Thrace presents the minimum (0) per capita GDP score.
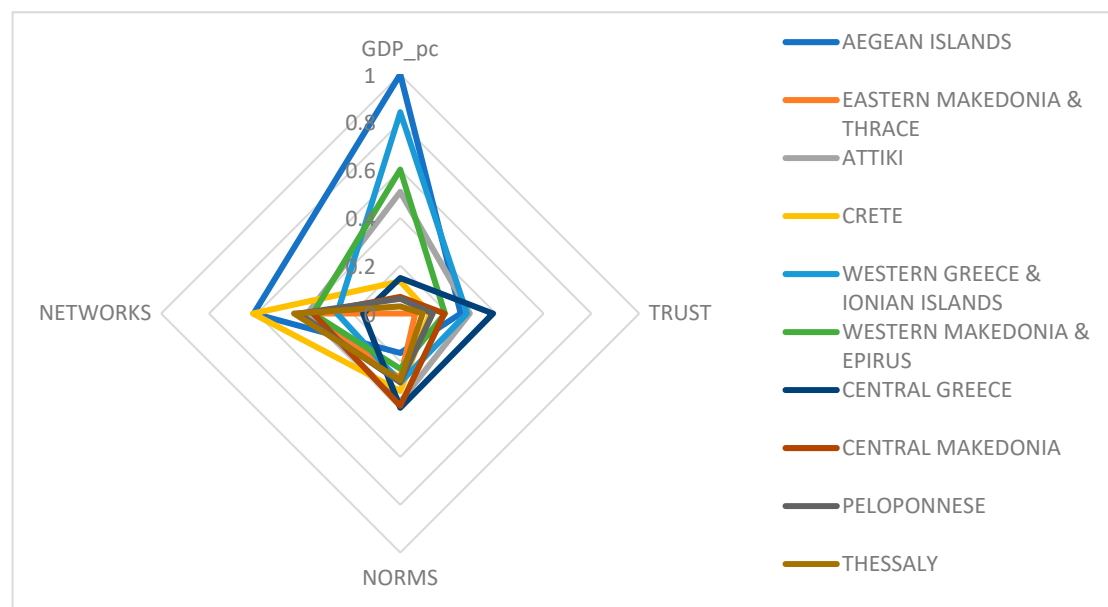
Based on the above and the extant literature regarding regional development patterns in Greece [78–80], we postulate here that growth changes (be them either positive or negative) will tend to reinforce the existing pattern of social capital–growth relationship in the regions under study. So, it can be assumed that in both cases (i.e., of positive or negative growth trends) regions have their own set of dynamic forces that are deployed and reproduced by the regionally established institutions. Since regional administration units are a central policy formation and implementation level, it is important to have information on how, why, and to what extent they deliver the national developmental goals to the regional and local levels of the societies. In turn, their own developmental agenda will be expected to inform such extra local initiatives. Thus, it is important to provide knowledge on the possible distances from the overall development goals and the relationship of social capital as a tool that might determine the existence and rationale of such distances. To empirically test for the presence of either of the above models, we propose the following hypotheses Hypothesis 1 and Hypothesis 2 corresponding to Statements 1 and 2 above:

Hypothesis 1. *A virtuous spiral is related to the presence of high social capital that is supported by positive micro and macro effects.*

Hypothesis 2. *A vicious cycle is related to the presence of high social capital that is supported by negative micro and/or macro effects.*

In building these hypotheses, we base our approach on the arguments of Maltz [81] who suggests that there are various choice contexts in which a person's reference point is 'naturally' linked to both endogenous and exogenous determinants. Maltz's [81] argument is that there are cases where the agent's exogenous endowment or status quo option or a risk calculation point [82,83] is linked to an endogenously determined reference point defined either by the person himself/herself [84,85], or by his/her economic environment [86]. The critical link he argues, may be identified in the sphere of '*similar features*' that allow individuals to easily and spontaneously make comparisons and use better alternatives as their '*new point of perspective from which other alternatives may be considered*' (pp. 160–161, [81]). In this context, the more content a person is with his/her current situation, the fewer the alternatives he/she even consider.

Bringing this analytical perspective into our research suggests that we might analyze a person's choice to hold (and report) particular types and levels of social capital as in accordance with his/her own understandings of the available alternatives and the benefits that they might (or might not) assume for him/her. We might also identify the micro level as the sphere of endogenous determinants and the regional level as the sphere where the macro/exogenous environmental determinants are evidenced. The intersection of these two spheres is made at the regional level.

The outcomes of these intersections are the assumed distances between the individual, the region, and the state as generated by the different social capital workings. Micro level, social capital is decisive of the number of groups that are meant to survive at the meso level, their power, and their interactions with the macro level. Under the former hypothesis, the social capital workings are devoted to blunting these distances while, under the latter hypothesis, social capital is used so as to preserve and possibly expand them. In both cases, it is proposed that countries operate at lower—than their national capabilities—levels and so the growth boundaries (G in Figures 1 and 2) of a society are drawn as a yet unmet, larger area. The assumption of unmet boundaries in terms of a country's macro capabilities can be used to illustrate the case where a positive regional growth–social capital relationship does not move the overall economy towards that boundary. Locally limited production processes and resource allocations might sustain a largely unfavorable growth process by means of a well-established and powerful social capital regime.

Overall, the distances assumed here between the individual level, the region, and the state refer to welfare differences and thus at the empirical level we might use a number of different welfare indicators in order to approximate such possible differences. In turn, greater equality, as a desirable societal goal,

might be evaluated in terms of different characteristics and functions of societies, i.e., achievements at the economic, social, environmental, and political spheres of the society.

3. Empirical Analysis

3.1. The Method

Multiple-criteria decision making (MCDM) is a branch of operations research dealing with making the choice of the best alternative based on various indicators, conflicting objectives, and criteria. Over the last years, methodologies that have been developed in this context have gained enormous popularity, mainly due to their flexibility and their ability to provide the decision-makers with a powerful tool for making decisions considering all the criteria and the objective simultaneously.

The technique for order of preference by similarity to ideal solution (TOPSIS) is one of the most popular and efficient used methods among MCDM. TOPSIS was first introduced by Hwang and Yoon [87]. Since then, it has largely been used to deal with the ranking problem of alternatives from the best to worst like the problem presented in this paper. The main advantage of the method is its capability to provide both positive and negative ideal solutions and subsequently to evaluate the alternatives based on indexes called closeness to the positive-ideal solution and remoteness from the negative-ideal solution. The chosen alternative should have the shortest distance from the ideal solution and the farthest from the negative-ideal solution. The application of the TOPSIS technique consists of the following steps [87]:

Step 1: Construction of the Decision Matrix and Weights of Criteria.

Given a set of alternatives under evaluation $A = \{A_i \mid i = 1, 2, \ldots, m\}$ and a set of criteria based on which the alternatives will be ranked $C = \{C_j \mid j = 1, 2, \ldots, n\}$, a decision matrix $X = \{x_{ij} \mid i = 1, 2, \ldots, m; \ j = 1, 2, \ldots, n\}$ contains the scores of each alternative to each criterion with x_{ij} representing the score of alternative i with respect to jth criterion.

The weights of the criteria, $w = \{w_j \mid j = 1, 2, \ldots, n; \sum_{j}^{n} w_j = 1\}$, represent the preference or their relative importance.

Step 2: Normalization of the decision matrix.

In most cases, the criteria are measured in different scales making the comparisons across them difficult. This step is aiming at transforming various attribute dimensions into non-dimensional ones allowing thus comparisons. In the literature, there exist several normalization methods, the most common one being the vector normalization method given by:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}}, \qquad i = 1, 2, \ldots, m, \qquad j = 1, 2, \ldots, n \qquad (1)$$

In this study, we use this normalization method since it is symmetric and computationally efficient. Furthermore, available knowledge suggests that it is suitable for the TOPSIS method (see for example [88–91]).

Step 3: Determination of the weighted normalized decision matrix.

The purpose of this step is to take into consideration the difference in importance that the criteria exhibit. The normalized decision matrix is calculated by

$$v_{ij} = w_j \times r_{ij}, \quad i = 1, 2, \ldots, m, \quad j = 1, 2, \ldots, n \qquad (2)$$

Step 4: Determination of the positive ideal and the negative ideal solutions.

In a multicriteria decision problem, alternatives often outperform in some criteria and underperform in some others. The goal of this step is to identify the positive ideal alternative (extreme performance on each criterion) and the negative ideal alternative (reverse extreme performance on each criterion). These two values are calculated as follows:

$$A^+ = \left\{v_1^+, \ldots, v_n^+\right\} = \left\{\left(\max_i v_{ij} \middle| j \in J^+\right), \left(\min_i v_{ij} \middle| j \in J^-\right) \middle| 1, \ldots, m\right\} \tag{3}$$

$$A^- = \left\{v_1^-, \ldots, v_n^-\right\} = \left\{\left(\min_i v_{ij} \middle| j \in J^+\right), \left(\max_i v_{ij} \middle| j \in J^-\right) \middle| 1, \ldots, m\right\} \tag{4}$$

where J^+ is the set of benefit criteria and J^- is the set of cost criteria.

Step 5: Calculation of the separation value.

The separation value represents the distance of each normalized score of alternative i from each of the aforementioned cases (ideal positive and negative points). It is calculated using the following formulas:

$$d_i^+ = \sqrt{\sum_{j=1}^{n}\left(v_{ij} - v_j^+\right)^2}, \quad i = 1, 2, \ldots, m \tag{5}$$

$$d_i^- = \sqrt{\sum_{j=1}^{n}\left(v_{ij} - v_j^-\right)^2}, \quad i = 1, 2, \ldots, m \tag{6}$$

Step 6: Calculation of relative distance to positive ideal position.

The relative distance to positive ideal solution, also called the closeness coefficients of each alternative, is calculated with respect to d_i^+ and d_i^- as:

$$R_i = \frac{d_i^-}{d_i^+ + d_i^-}, i = 1, 2, \ldots, m \tag{7}$$

The set of the alternatives are then ranked by the descending order of the value of R_i.

One of the main problems arising during the application of TOPSIS is the selection of the appropriate weights for the corresponding criteria. In the literature, there exist a huge amount of approaches for this purpose, the evolution of experts in TOPSIS, the application of the AHP [91], and the Delphi method to just name a few. The vast majority of these approaches employs the subjective assessments of the decision-makers.

On the other hand, Shannon's entropy method [92] has been proposed as an alternative methodology able to effectively avoid the effects of human subjective factors. The entropy weight method was firstly introduced from thermodynamics to information systems. The main advantage of the method is that the calculation of the weights is not based on subjective assessments of evaluators but on the inherent information contained in the scores of alternatives for each of the criteria. Therefore, its computational process leads to the extraction of objective weights.

Given a set of alternatives, a set of criteria, and a decision matrix defined previously, the following procedure summarizes the calculation of the entropy weights.

1. The decision matrix is normalized by

$$p_{ij} = \frac{x_{ij}}{\sum_{i=1}^{m} x_{ij}}, \quad i = 1, 2, \ldots, m, \quad j = 1, 2, \ldots, n \tag{8}$$

2.　The information entropy for each index is defined as

$$E_j = -\frac{\sum_{i=1}^{m} p_{ij} \ln p_{ij}}{\ln m}, \; i = 1, 2, \ldots, m, \; j = 1, 2, \ldots, n \tag{9}$$

The larger the E_j, the less information is transmitted by the jth criterion.

3.　The weights obtained from information entropy are calculated as:

$$w_j = \frac{\left(1 - E_j\right)}{n - \sum_{j=1}^{n} E_j} \tag{10}$$

where $0 \leq w_j \leq 1$ and $\sum_{j=1}^{n} w_j = 1$.

3.2. Data and Variables

For our empirical analysis we use data from two sources. The first one is the European Social Survey (ESS) database that provides detailed individual level social capital data for Greece. Of the four rounds for which data are available for Greece, we have selected Rounds 1 (R1-2002) and 4 (R4-2008) the first and the last available round, which provide data at the regional level (10 NUTS II Greek regions). In addition, we use the income satisfaction variable that is measured in these datasets, as our micro-level weights. The data referring to regional level growth and which are used as our macro-level weights are drawn from the Hellenic Statistical Authority (HSA).

As noted earlier, our operational definition of social capital is based on the concept's multiple character [1–4,8–10], which is incorporated in our analysis through the use of different constructs and items. Among the large body of research that reports the various components, which sum up to social capital, we base our analysis on the works of Paldam [26], Engbers, Thompson, and Slaper [27], and Beugelsdijk and Welzel [37]. Indicative theoretical and empirical analyses in the case of Greece are, among others, the studies of Lyberaki and Paraskevopoulos [93] and Daskalopoulou [94]. In line with these contributions, we identify here three main social capital constructs namely trust, networks, and norms/values, which serve as our Level 1 criteria, and nine items, namely generalized trust, institutional trust, ethics, aspirations, cultural rules, formal and latent political participation, associational activity, and activism, which serve as our Level 2 criteria. Using the available ESS data we choose the following variables as proxies to these constructs and items: For the Trust component of social capital we use two sub-criteria: (1) Generalized trust (i.e., trust in unknown others) and (2) institutional trust (i.e., trust in key political, security, and civil service institutions such as the parliament, the police, justice, and supranational political institutions). For the Norms and values component of social capital we use three sub-criteria: (1) Ethics (personal views about the codes of conduct with other people), (2) aspirations (personal views about the goals that are worthy to pursue), and (3) cultural rules (personal views on critical societal values). Finally, for the Networks and associational activity component of social capital we use four sub-criteria: (1) Formal political participation (emphasis on tangible engagement—observable actions), (2) informal political participation (latent political engagement—emphasis on ideology and emotions), (3) associational activity (participation in sectoral associations, religiousness etc.), and (4) activism (abstract forms of engagement and action). Table 1 briefly summarizes the Level 1 and Level 2 criteria used in our analysis. Table A1 in the Appendix A analytically presents the variables used, their measurement, as well as basic descriptive statistics.

Table 1. Level 1 and Level 2 criteria for technique for order of preference by similarity to ideal solution (TOPSIS).

Level 1 Criteria	Level 2 Criteria	Components
Trust	*Generalised trust*	Trust in unknown others
	Institutional trust	Trust in parliament, political parties, politicians, police, justice, supranational political institutions
Norms/Values	*Ethics*	Equality, tolerance, humble and modest, helpful, behave properly, get respect from others, loyal and devotion to friends and people close
	Aspirations	Be rich, show abilities and be admired, try new and different things in life, have a good time, make own decisions and be free, be successful and that people recognize achievements, seek adventures and have an exciting life, seek fun and things that give pleasure
	Cultural rules	Live in secure and safe surroundings, do what is told and follow rules, government is strong and ensures safety, care for nature and environment, follow traditions and customs
Networks/Associations	*Formal political participation*	Member of political party, voted last national election, contacted politician or government official last, worked in political party or action group
	Latent political participation	How interested in politics, feel closer to a particular party than all other parties, how close to party
	Associational activity	Socially meet with friends, relatives or colleagues, religiosity, trade union or similar organisation
	Activism	Voluntary work in association, campaign badge/sticker, signed petition, lawful public demonstration, boycotted certain products

Source: Authors' elaborations.

4. Results

In this section, the results of our proposed methodology are presented. Before that, however, we briefly discuss the basic descriptive statistics of our micro and macro-level indicators as they present significant and rather stable differences amongst the 10 Greek regions.

Table 2 presents some basic descriptive statistics for the income satisfaction variable used here as the micro-level weight of our ranking analysis. As shown, average income satisfaction for the country remains almost the same during the 2002–2008 period (from 2.59 to 2.58). It is interesting that in both periods of time, the minimum rate of income satisfaction is observed in the Aegean Islands region while the maximum rate of average income satisfaction is reported for the Western Greece and Ionian Islands region.

Table 3 presents the per capita GDP values as reported for the 10 Greek regions. It is important to note that the country average has increased between the 2002–2008 period, but the higher and the lower scores have remained with the same two regions namely the Aegean Islands in the first case, and the Eastern Makedonia and Thrace Region, in the second case. Figure 5 graphically presents the normalized regional per capita GDP scores that are used in our analysis. As shown, the positive

growth rates observed in the case of all regions have not changed their relative position with respect to the country average (Figure 5).

Table 2. Descriptive statistics for income satisfaction levels per region.

	Region—NUTS II	2002	2008
1	Aegean Islands	2.12	2.25
2	Eastern Makedonia & Thrace	2.80	2.94
3	Attiki	2.55	2.50
4	Crete	2.58	2.62
5	Western Greece & Ionian Islands	2.80	3.26
6	Western Makedonia & Epirus	2.67	2.55
7	Central Greece	2.60	3.05
8	Central Makedonia	2.56	2.36
9	Peloponnese	2.62	2.53
10	Thessaly	2.54	2.30
	Country average	2.59	2.58
	Minimum	2.12	2.25
	Maximum	2.80	3.26
	St. Dev.	0.18	0.32

Source: Own elaborations of ESS R1 and R4 data. Note: Income satisfaction is a positively recoded 4-point scale variable (4 = Living comfortably on present income, 3 = Coping on present income, 2 = Difficult on present income, 1 = Very difficult on present income).

Table 3. Per capita gross domestic product by Nuts II, Greece.

	Region–NUTS II	2002	2008
1	Aegean Islands	26,908.79	42,393.70
2	Eastern Makedonia & Thrace	11,316.37	15,567.88
3	Attiki	19,310.09	29,215.07
4	Crete	13,660.17	19,176.24
5	Western Greece & Ionian Islands	25,759.78	38,151.77
6	Western Makedonia & Epirus	25,111.02	31,708.08
7	Central Greece	15,188.53	19,552.28
8	Central Makedonia	12,170.03	17,437.45
9	Peloponnese	12,321.51	17,223.78
10	Thessaly	11,660.38	16,363.23
	Country average	14,993.64	21,844.50
	Minimum	11,316.37	15,567.88
	Maximum	26,908.79	42,393.70
	St. Dev.	6044.42	9391.80

Source: Hellenic Statistical Authority. Note: In euro, at current prices.

The findings of our analysis are obtained by a script, which was developed in the programming language R [95] using the MCDA package [96]. Before we proceed with the analysis of the regional social capital patterns it is important to note some interesting findings regarding the relevant weights that entropy procedure has estimated for the criteria used in our ranking analysis (Table 4). In 2002, generalized trust (a Trust component) is the most important component (weight equal to 0.561) followed by aspirations (a Norms component) (weight equal to 0.134). In 2008, quite a different picture is observed. Now both components of Trust are important and actually of almost equal importance (generalized trust has a weight of 0.288 and institutional trust has a weight of 0.276). The Norms component of social capital is again important as cultural rules and ethics show increased weights (0.176 and 0.121, respectively). It is quite interesting that the Networks component of social capital does not show high weights in both periods of the analysis. We discuss on the possible reasons for such a finding below, where an overall analysis might be derived given the regional ranking results and the micro- and macro-level effects on these rankings.
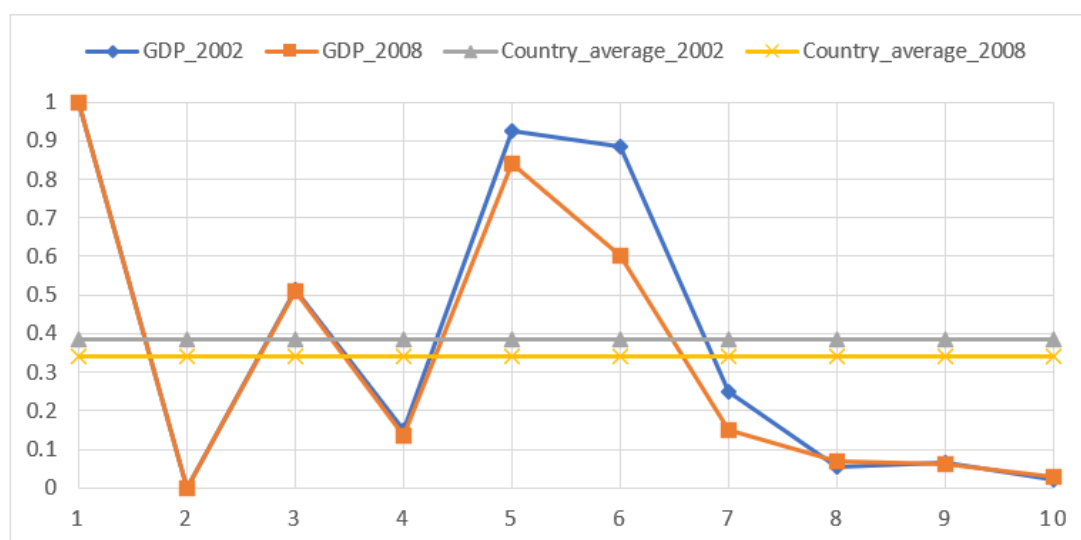
Figure 5. Regional per capita GDP rates in Greece. **Source:** Own elaborations of HSA data. Notes: Per capita GDP has been normalized on a 0–1 scale. The region of Aegean Islands presents the maximum rate (1) in both periods of time. The region of Eastern Makedonia and Thrace presents the minimum (0) per capita GDP in both periods. The horizontal axis numbering involves the following regional classifications (NUTSII): (1) Aegean Islands, (2) Eastern Makedonia & Thrace, (3) Attiki, (4) Crete, (5) Western Greece & Ionian Islands, (6) Western Makedonia & Epirus, (7) Central Greece, (8) Central Makedonia, (9) Peloponnese, (10) Thessaly.

Table 4. Estimated entropy weights.

		2002	2008
Trust	Generalised trust	0.561	0.288
	Institutional trust	0.074	0.276
	Ethics	0.081	0.121
Norms/Values	Aspiration	0.134	0.028
	Cultural rules	0.095	0.176
Networks/Associations	Formal political participation	0.013	0.009
	Latent political participation	0.012	0.081
	Associational activity	0.027	0.017
	Activism	0.004	0.004

Tables 5 and 6 present the results of our empirical estimations. Table 5 presents the rankings of the 10 Greek regions for 2002. In particular, the first two columns present the regions' scores and their corresponding ranking using TOPSIS analysis on the initial data. The next two columns present regional scores and the corresponding ranking when TOPSIS is applied on the data incorporating the micro-level indicator. Finally, the last two columns present regional scores and the corresponding ranking when using TOPSIS on the data embrace the macro–level indicator. As mentioned earlier, in line with the study's main aim, we use economic indicators at the individual and regional levels (individual level income satisfaction evaluations and regional per capita GDP) as our corresponding indicators so as to capture different regional social capital–growth interrelation patterns. It is interesting that the use of micro and macro indicators significantly alters the ranking position of almost all regions. This is true for both periods in our analysis. Table 6 presents the corresponding evaluations for 2008. Again, it is shown that the ranking that is produced with entropy weights changes when micro– and macro–level effects are introduced in the analysis.

Table 5. TOPSIS results of entropy weights—2002.

Region—NUTS II	No Effect		Micro Effect		Macro Effect	
	Score	Rank	Score	Rank	Score	Rank
Thessaly	0.93	1	0.37	2	0.04	9
Eastern Makedonia & Thrace	0.53	2	0.36	3	0.03	10
Crete	0.50	3	0.03	10	0.16	6
Aegean Islands	0.36	4	0.97	1	0.96	1
Attiki	0.30	5	0.19	9	0.49	4
Central Makedonia	0.29	6	0.22	7	0.06	7
Western Makedonia & Epirus	0.21	7	0.34	4	0.79	2
Central Greece	0.13	8	0.24	6	0.21	5
Western Greece & Ionian Islands	0.06	9	0.20	8	0.72	3
Peloponnese	0.05	10	0.30	5	0.06	8

Table 6. TOPSIS results of entropy weights—2008.

Region—NUTS II	No Effect		Micro Effect		Macro Effect	
	Score	Rank	Score	Rank	Score	Rank
Central Greece	0.69	1	0.78	2	0.20	5
Attiki	0.62	2	0.32	5	0.49	4
Central Makedonia	0.55	3	0.20	8	0.16	7
Aegean Islands	0.50	4	0.16	10	0.79	1
Western Makedonia & Epirus	0.50	5	0.30	6	0.53	3
Western Greece & Ionian Islands	0.49	6	0.82	1	0.68	2
Thessaly	0.46	7	0.17	9	0.15	9
Crete	0.43	8	0.39	4	0.18	6
Peloponnese	0.41	9	0.28	7	0.15	8
Eastern Makedonia & Thrace	0.24	10	0.54	3	0.15	10

Figures 6 and 7 present the ranking results for the two periods of our analysis. Both graphics are quite illustrative of the changes that are produced as a result of the micro and macro-level effects on regional social capital rankings. To that extent, it is relevant to incorporate here a brief comment on the potential causes for, and the importance of, these findings. The first important source of variation relates to social capital weights being sensitive to social capital changes during the period of our analysis. While acknowledging the importance of trust, which is found and accounted for, we should note here the importance of norms and values as dominant cultural features (exceeding networking activity). Combined with the lack of a clear and focused regional development policy agenda, the prevailing norms and values have caused the country to delay (and often fail) to fulfill its developmental prospects at the national and the regional level [79,97]. Bitros [97] provides an insightful discussion of how the pre-crisis prevailing rent-seeking norms and practices (among other structural impediments) have structured the base for the crisis to severely hit the country. The role of fragmented and inconsistent policies as underlying the regional development agenda is discussed by Christofakis and Papadaskalopoulos [79] who analytically present the largely unmet dynamics of regions, metropolitan centers, and all other areas in the country. The second source of variation relates to social capital weights being sensitive to growth effects as experienced at the individual and the collective levels. In that respect, it is interesting that in a high-growth period for the country (the period of analysis, 2002–2008, involves the time just before and after Greece has hosted the 2004 Olympic Games), we do not observe the necessary diffusion of growth at the regional level nor do we observe uniform positive effects to regional stocks of social capital. Taken together, both sources of variation seem to suggest that the underlying regional development dynamics are more complex and should perhaps be subject to more focused policies.
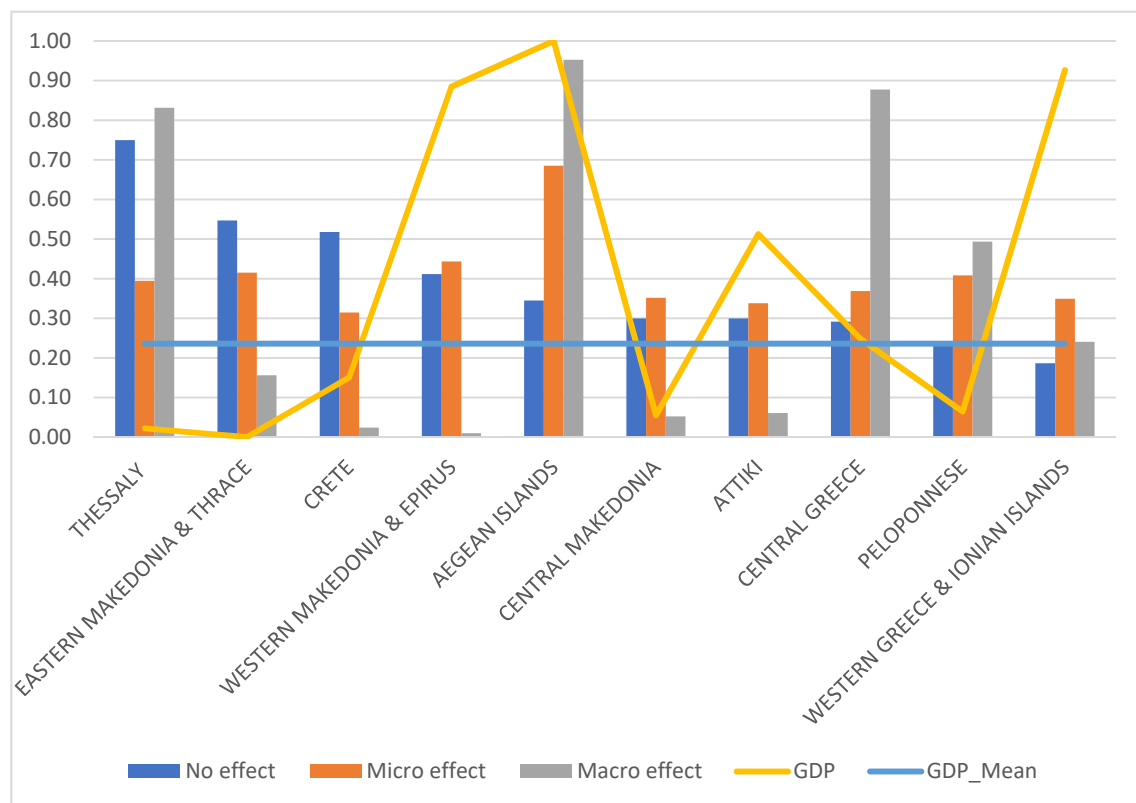
Figure 6. Social capital in the 10 Greek regions using TOPSIS—2002. Source: Authors' elaborations.
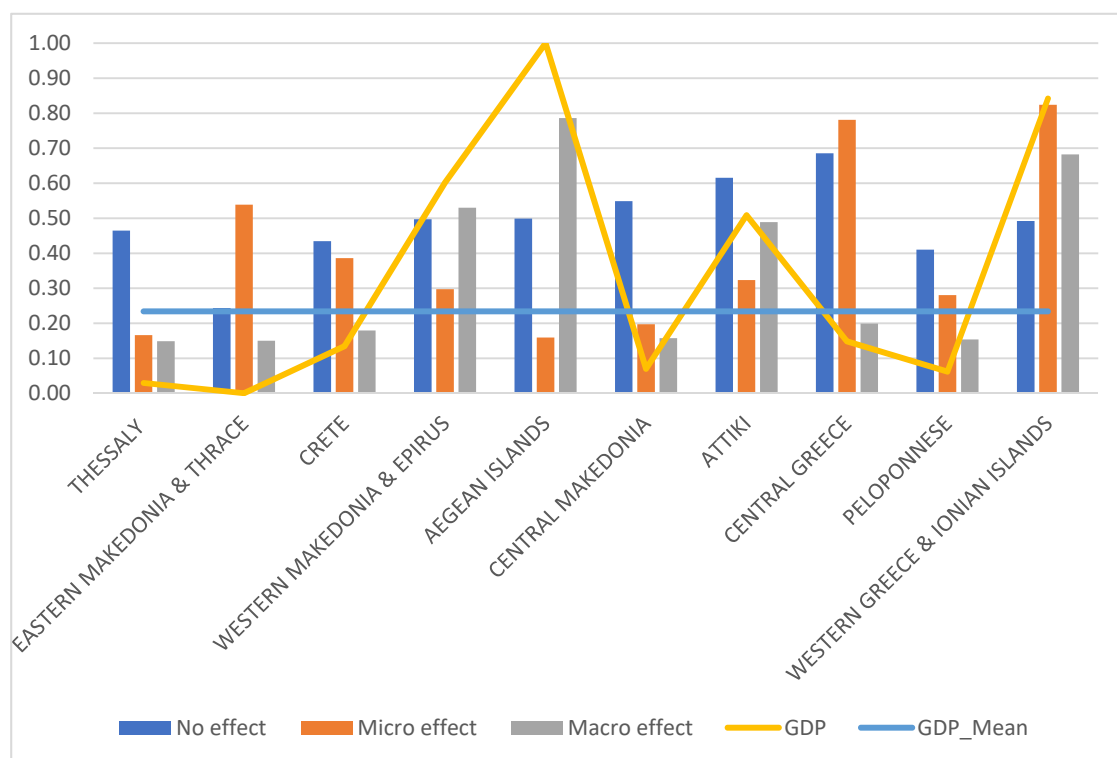

Figure 7. Social capital in the 10 Greek regions using TOPSIS—2008. Source: Authors' elaborations.

Based on these results, we may argue that both hypotheses H1 and H2 are supported in the case of Greece. Table 7 summarizes the results of H1 and H2 as observed for the 10 Greek regions in the two periods of analysis. As shown, H1 is verified for a small number of regions while H2 seems to describe

the situation characterizing most Greek regions. Two issues need to be noticed. The first one relates to the dynamics that underlie the situation observed in each of the 10 Greek regions. Six out of the 10 Greek regions have changed position in the classification matrix suggesting that there exists a dynamic interplay between micro– level factors and macro–level processes and this interplay is well-reported on the intersection of these processes with peoples' evaluations of social capital (Table 7).

Table 7. A social capital classification of the 10 NUTS II Greek regions based on TOPSIS results.

2008		Macro Effect	
		Positive	**Negative**
Micro effect	**Positive**	*H1* Western Greece & Ionian Is., Crete *, Peloponnese	*H2* Eastern Makedonia & Thrace *
	Negative	*H2* Aegean Islands *, Western Makedonia & Epirus *	*H2* Central Greece *, Attiki *, Central Makedonia, Thessaly
2002		Macro Effect	
		Positive	**Negative**
Micro effect	**Positive**	*H1* Aegean Islands, Western Makedonia & Epirus, Western Greece & Ionian Islands, Peloponnese, Central Greece	
	Negative	*H2* Attiki	*H2* Thessaly, Eastern Makedonia & Thrace, Crete, Central Makedonia

* Indicates a region that has changed classification during the 2002–2008 period.

The second important finding relates to the regions that show an unstable profile (Table 7). In particular, the only regions that have shown to experience a stable and dynamic profile are the Western Greece and Ionian Islands region and the Peloponnese region. Both regions are based on the operation of high-growth urban poles and high-income generation activities [78–80]. Thus, their classification seems to suggest that the level of growth that they experience is to a large extent diffused in the society, at least to the extent that individual–level evaluations of income satisfaction do substantiate the regions' social capital levels. On the other hand, a stable but stagnant profile is shown by the Central Makedonia and the Thessaly regions. This finding is interesting to the extent that the Central Makedonia region is the location of the country's second metropolitan area of Thessaloniki and an industrial production hub whereas the Thessaly region concentrates the largest amount of the country's agricultural production. These findings are largely in line with the arguments of Christofakis and Papadaskalopoulos [79] as discussed earlier. In terms of the hypothesis of unmet regional growth potential as proposed here, these findings seem to strongly verify it, The six regions that have changed position during the period of analysis present a mixed picture. The region of Crete is the only region reported as stagnant in 2002 but as a dynamic one in 2008. In contrast, the opposite course is shown in the case of the Central Greece region that moves from the position of a dynamic region in 2002 to the position of a stagnant region in 2008. The Aegean Islands region and the Western Makedonia and Epirus regions have also followed a negative course by moving from a dynamic position in 2002 to a negative micro-position in 2008. Individual–level effects are again very important since both regions have production and development poles (e.g., Kozani in the region of Western Makedonia and Epirus and the most popular islands of Mykonos and Santorini in the Aegean Islands) suggesting that it is the distribution of incomes within the region that might be the most critical parameter for peoples' overall

evaluations of the regions' developmental capabilities and consequently of their assessments over the regions' social capital stock. Finally, the Eastern Makedonia and Thrace region seems to present an improvement to the extent that micro-level evaluations seem to enhance its partially positive position in 2008 and move it from an overall negative position that the region held in 2002 (Table 7).

Overall, the above findings suggest that different regional social capital patterns are present in Greece and they might be related to different development patterns as manifested by the variations in which hypotheses H1 and H2 are observed. Three types of regions might be detected suggesting that we might distinguish between dynamic regions (Western Greece and Ionian Islands, Peloponnese), stagnant regions (Central Makedonia and Thessaly), and unstable regions (all other regions).

5. Conclusions and Discussion

5.1. Discussion

The present study analyzes social capital as a regional stock of capital that interacts with the economic goals of each region and shapes their success in achieving these goals. Using an inclusive theorization of social capital as composed of trust, norms, and networks we are able to capture the possible effects that all types of social capital relations might exert upon a region's development. At the theoretical level, we propose a model for the identification of the interactions between regional social capital and regional growth as leading to either a virtuous spiral or a vicious cycle model of development. A virtuous spiral assumes a rather open system supported by the presence of social capital that induces regional growth rates. In contrast, a vicious cycle is a rather closed system that sustains either stagnation or asymmetries between the micro and macro-level dimensions of regional growth. We empirically test for the presence of these models of regional growth via the use of two corresponding operational hypotheses. In that respect, the use of appropriate multicriteria techniques (entropy-TOPSIS) allows us to first extract the importance of each of the criteria used in our analysis (i.e., social capital constructs and items identified here as Level 1 and Level 2 criteria) and second obtain different rankings of regions given the effects of micro and macro-level indicators. In order to observe the possible underlying dynamics of the assumed models, we use two period ESS data (2002, 2008) for the 10 NUTS II regions of Greece.

Our analysis produces quite interesting results. The first important finding relates to the relative importance of the social capital criteria used here. It is interesting that the trust and norms component seem to dominate as the critical social capital factors (higher weights) while for networks the estimated weights are rather low. Given that networks as analyzed here cover all types of associations (formal and latent political participation, sectoral associations, and activism) we might reasonably assume that their effect might as well be incorporated in the trust criterion (trust among the members of the region) and the pursuit of goals as expressed in the norms criterion. Indeed, the estimated results show that generalized trust is a high weight component a fact that suggests commonly shared expectations about the trustworthiness and the behavior of unknown others in the local communities. On the other hand, high values of norms (measured here as ethics, aspirations, and cultural rules) suggest that regions might be characterized as rather homogeneous in terms of commonly held views of what is important to pursue and how. To that extent, further analysis is needed as to the possible presence of 'social capital elites' [55] that might drive regions towards certain (under) development paths. This is an interesting line of future research that could be accommodated in an extension of the analytical context proposed here.

The second important finding is that our analysis provides support for the presence of different regional development patterns as approximated through distances between micro- and macro-level growth indicators. Based on our TOPSIS results, we might categorize the 10 Greek regions into three groups, namely the dynamic, the stagnant, and the unstable regions. The underlying workings of the social capital variables is important and different in each case. The two poles, i.e., dynamic regions and stagnant regions seem to have more clearly understood development patterns. In the first

case, we might argue that dynamic regions need to be further supported in their direction to expand. In the second case, sectoral policies can be said to be the key for the support of stagnant regions (e.g., agricultural policy in the case of Thessaly and industrial policy in the case of Central Makedonia). Unstable regions present a mixed and perhaps an even more challenging case. Macro-level growth that is not in line with micro-level support of that growth trend obviously points to asymmetries in the economic growth process and particularly in the allocation of growth benefits to the society. In contrast, it is also problematic to see micro-level satisfaction with income allocation to be combined with negative macro-level growth effects. Given that this is observed in a borderline and remote region of the country (Eastern Makedonia and Thrace) we might take this case to be the outcome of underdevelopment, increased dependence on social support policies, and the premise of social values that further support the rather closed local communities. In any case this is also a finding that renders further research.

Overall, our results indicate the appropriateness of using income satisfaction as a micro-level reference point and regional per capital GDP as a macro-level reference point in weighting the regional social capital resource. The ranking of regions changes significantly as a result of applying such weights suggesting that both are at play in the way in which social capital is articulated in their model of development. This is important and relevant for the case of policies designed to alleviate obstacles or boost a region's developmental potential.

5.2. Limitations and Further Research

As a last point in our discussion, we should refer to the limitations of our study and suggest how future research in the field might serve to overcome these limitations and expand the theoretical and empirical contribution of the model proposed here. Given the available data, our estimated results cannot be used for current policy analysis and design, which will of course have to be based on more recent evidence and this is acknowledged as a limitation of the present study. The post-crisis situation of the country and its regions is expected to be different—worse—not only in terms of economic development (lower growth and investment rates, unemployment, etc.), but also in terms of social capital (and Greece has already been a low social capital country, [93,94,97]). To that extent, the current results are exploratory and can be taken to support the proposed conceptual model and its empirical operationalization. To that extent, is important to note that the current results constitute a useful comparison base with future evidence regarding Greece. Indeed, the study of the regional patterns underling the economic development–social capital interrelationship as formed in the post crisis environment in the country, is critical for the design of regional development policies. Thus, future research might relate to performing the proposed analysis with more recent data in order to obtain insights that are relevant for policy makers working in the field and trying to design tools that incorporate the recent trends and changes and particularly the effects that the recent financial crisis has had upon regional development patterns in Greece and the role of social capital on them. This is important given that the conceptual and methodological analysis proposed here provides results that articulate well with the available knowledge regarding regional development profiles in Greece, while we propose a model that can be used to measure the effect of regional social capital stocks on a number of other important welfare outcomes. To that extent, future research in the field could focus on using the proposed model in order to classify regions not only in terms of economic growth but also in terms of other social welfare indicators ranging from health and subjective wellbeing to safety and administration efficacy, for example. Finally, in addition to these comments, it is important to note that the proposed conceptual framework and the empirical approach might be used to produce different regional rankings resulting by the calculation of alternative sets of entropy weights. The available knowledge regarding the regional development patterns in Greece [78–80] can be used as a basis for the estimation of such alternative sets of weights. In turn, such a comparison will allow us to generate a regional evolution pattern that will be based on the comparison / synthesis of different analytical approaches, datasets, and methods.

Appendix A

Table A1. Definition, measurement, and basic descriptive statistics of the social capital items.

Variables, Definition and Measurement	2002		2008	
	Mean	Std. Deviation	Mean	Std. Deviation
Trust				
Generalized trust				
Most people can be trusted or you can't be too careful (0–10, 10 = most people can be trusted)	3.64	2.522	3.92	2.270
Institutional trust				
Trust in country's parliament (0–10, 10 = complete trust)	4.79	2.727	3.58	2.450
Trust in political parties (0–10, 10 = complete trust)	n.a.	n.a.	2.53	2.136
Trust in politicians (0–10, 10 = complete trust)	3.41	2.554	2.44	2.096
Trust in the police (0–10, 10 = complete trust)	6.44	2.780	4.86	2.663
Trust in the legal system (0–10, 10 = complete trust)	6.29	2.793	4.75	2.618
Trust in the European Parliament (0–10, 10 = complete trust)	5.69	2.563	4.40	2.525
Norms/Values				
Ethics				
Important that people are treated equally and have equal opportunities (1–6, 6 = not like me at all)	1.80	0.879	1.76	.906
Important to understand different people (1–6, 6 = not like me at all)	2.14	0.955	2.13	1.052
Important to be humble and modest, not draw attention (1–6, 6 = not like me at all)	2.31	1.095	2.46	1.180
Important to help people and care for others well-being (1–6, 6 = not like me at all)	2.01	0.890	1.90	.908
Important to behave properly (1–6, 6 = not like me at all)	2.12	1.004	2.16	1.107
Important to be loyal to friends and devote to people close (1–6, 6 = not like me at all)	1.82	0.850	1.76	.873
Important to get respect from others (1–6, 6 = not like me at all)	2.45	1.234	2.15	1.150
Aspirations				
Important to be rich, have money and expensive things (1–6, 6 = not like me at all)	3.54	1.354	3.19	1.446
Important to show abilities and be admired (1–6, 6 = not like me at all)	2.74	1.307	2.34	1.235
Important to try new and different things in life (1–6, 6 = not like me at all)	2.73	1.324	2.66	1.311
Important to have a good time (1–6, 6 = not like me at all)	2.90	1.368	2.45	1.253
Important to be successful and that people recognize achievements (1–6, 6 = not like me at all)	2.85	1.273	2.58	1.289
Important to make own decisions and be free (1–6, 6 = not like me at all)	2.06	0.990	1.89	0.953

Table A1. *Cont.*

	2002		2008	
Variables, Definition and Measurement	**Mean**	**Std. Deviation**	**Mean**	**Std. Deviation**
Important to seek fun and things that give pleasure (1–6, 6 = not like me at all)	2.56	1.298	2.50	1.289
Cultural rules				
Important to live in secure and safe surroundings (1–6, 6 = not like me at all)	1.72	0.926	1.75	1.011
Important to do what is told and follow rules (1–6, 6 = not like me at all)	2.55	1.285	2.72	1.351
Important that government is strong and ensures safety (1–6, 6 = not like me at all)	1.74	0.953	1.77	1.020
Important to care for nature and environment (1–6, 6 = not like me at all)	1.85	0.866	1.83	0.963
Important to follow traditions and customs (1–6, 6 = not like me at all)	1.75	0.913	2.15	1.167
Networks/Associations				
Formal political participation				
Voted last national election, dummy 1 = yes	0.10	0.305	0.13	0.336
Member of political party, dummy, 1 = yes	0.05	0.215	0.07	0.262
Contacted politician or government official last 12 months, dummy, 1 = yes	0.15	0.352	0.10	0.299
Worked in political party or action group last 12 months, dummy, 1 = yes	0.05	0.217	0.04	0.194
Latent political participation				
How interested in politics (1–4, 4 = not at all interested)	2.93	0.969	2.93	0.911
Feel closer to a particular party than all other parties, dummy, 1 = yes	0.57	0.496	1.41	0.492
How close to party (1–4, 4 = not at all close)	1.85	0.622	1.97	0.607
Associational activity				
How often socially meet with friends, relatives or colleagues (1–7, 7 = every day)	4.14	1.783	4.21	1.600
How religious are you (0–10, 10 = very religious)	7.67	2.218	6.27	2.538
How often attend religious services apart from special occasions (1–7, 7 = never)	4.30	1.255	4.65	1.173
Member of trade union or similar organization, dummy, 1 = yes	0.11	0.305	2.74	0.603
Activism				
Worn or displayed campaign badge/sticker last 12 months, dummy, 1 = yes	0.03	0.162	1.97	0.175
Signed petition last 12 months, dummy, 1 = yes	0.05	0.210	1.95	0.214
Taken part in lawful public demonstration last 12 months, dummy, 1 = yes	0.05	0.203	1.94	0.235
Boycotted certain products last 12 months, dummy, 1 = yes	0.08	0.279	1.85	0.359
Worked in another organisation or association last 12 months, dummy, 1 = yes	0.06	0.231	0.04	0.193

Source: Own elaborations of ESS R1 & R4 data for Greece.

References

1. Knack, S.; Keefer, P. Does social capital have an economic payoff? A cross-country investigation. *Q. J. Econ.* **1997**, *112*, 1251–1288. [CrossRef]
2. Helliwell, J.F.; Putnam, R.D. Economic growth and social capital in Italy. *East. Econ. J.* **1995**, *21*, 295–307.

3. Putnam, R.D. The prosperous community: Social capital and public life. *Am. Prospect.* **1993**, *13*, 35–42.

4. Neira, I.; Vázquez, E.; Portela, M. An empirical analysis of social capital and economic growth in Europe (1980–2000). *Soc. Indic Res.* **2009**, *92*, 111–129. [CrossRef]

5. Baliamoune-Lutz, M. Trust-based social capital, institutions, and development. *J. Soc. Econ.* **2011**, *40*, 335–346. [CrossRef]

6. Elgar, F.J.; Davis, C.G.; Wohl, M.J.; Trites, S.J.; Zelenski, J.M.; Martin, M.S. Social capital, health and life satisfaction in 50 countries. *Health Place* **2011**, *17*, 1044–1053. [CrossRef] [PubMed]

7. Thompson, M. Social capital, innovation and economic growth. *J. Behav. Exp. Econ.* **2018**, *73*, 46–52. [CrossRef]

8. Arrow, K.J. Observations on social capital. In *Social Capital: A Multifaceted Perspective*; Dasgupta, P., Serageldin, I., Eds.; The World Bank: Washington, DC, USA, 2000; pp. 3–5.

9. Woolcock, M. Social capital and economic development. *Theory Soc.* **1998**, *27*, 151–208. [CrossRef]

10. Dasgupta, P. Economic progress and the idea of social capital. In *Social Capital: A Multifaceted Perspective*; Dasgupta, P., Serageldin, I., Eds.; The World Bank: Washington, DC, USA, 2000; pp. 325–424.

11. Fukuyama, M.F. *Social Capital and Civil Society*; International Monetary Fund: Washington, DC, USA, 2000.

12. Brehm, J.; Rahn, W. Individual—Level evidence for the causes and consequences of social capital. *Am. J. Polit. Sci.* **1997**, 999–1023. [CrossRef]

13. Snidjers, T.A.B. Prologue to the measurement of social capital. *Rev. Tocqueville Tocqueville Rev.* **1999**, *20*, 27–44.

14. Van der Gaag, M.P.J. Proposals for the measurement of individual social capital. In *Creation and Returns of Social Capital*; Flap, H.D., Volker, B., Eds.; Routledge: London, UK, 2003; pp. 199–218.

15. Yamagishi, T. The provision of a sanctioning system in the United States and Japan. *Soc. Psych. Quart.* **1988**, *51*, 265–271. [CrossRef]

16. Yamagishi, T.; Cook, K.; Watabe, M. Uncertainty, trust, and commitment formation in the United States and Japan. *Am. J. Soc.* **1998**, *104*, 165–194. [CrossRef]

17. Fukuyama, F. *Trust: The Social Virtues and the Creation of Prosperity*; Free Press: New York, NY, USA, 1995; Volume 99.

18. Lamont, M.; Lareau, A. Cultural capital: Allusions, gaps and glissandos in recent theoretical developments. *Soc. Theory* **1988**, 153–168. [CrossRef]

19. Robbins, D. The origins, early development and status of Bourdieu's concept of 'cultural capital'. *Br. J. Soc.* **2005**, *56*, 13–30. [CrossRef] [PubMed]

20. Pisani, E.; Christoforou, A.; Secco, L.; Franceschetti, G. Introduction: Motivation, Aim and Contributions. In *Social Capital and Local Development*; Palgrave Macmillan: Cham, Switzerland, 2017; pp. 3–22.

21. Andriani, L.; Christoforou, A. Social capital: A roadmap of theoretical and empirical contributions and limitations. *J. Econ. Issues* **2016**, *50*, 4–22. [CrossRef]

22. Olson, D.L. Comparison of weights in TOPSIS models. *Math. Comput. Model.* **2004**, *40*, 721–727. [CrossRef]

23. Gambetta, D. Can we trust. In *Trust: Making and Breaking Cooperative Relations*; Gambetta, D., Ed.; Oxford: Blackwell, UK, 1988; pp. 213–238.

24. Levi, M. Social and unsocial capital: A review essay of Robert Putnam's. *Mak. Democr. Work. Politics Soc.* **1996**, *24*, 45–55. [CrossRef]

25. Van Oorschot, W.; Arts, W.; Gelissen, J. Social capital in Europe: Measurement and social and regional distribution of a multifaceted phenomenon. *Acta Soc.* **2006**, *49*, 149–167. [CrossRef]

26. Paldam, M. Social capital: One or many? Definition and measurement. *J. Econ. Surv.* **2000**, *14*, 629–653. [CrossRef]

27. Engbers, T.A.; Thompson, M.F.; Slaper, T.F. Theory and measurement in social capital research. *Soc. Indic. Res.* **2017**, *132*, 537–558. [CrossRef]

28. Freitag, M.; Traunmüller, R. Spheres of trust: An empirical analysis of the foundations of particularised and generalised trust. *Eur. J. Polit. Res.* **2009**, *48*, 782–803. [CrossRef]

29. Hudson, J. Institutional trust and subjective well-being across the EU. *Kyklos* **2006**, *59*, 43–62. [CrossRef]

30. Cote, S.; Healy, T. *The Well-Being of Nations: The Role of Human and Social Capital*; Organization for Economic Co-operation and Development: Paris, France, 2001.

31. Lloyd, K.M.; Auld, C.J. The role of leisure in determining quality of life: Issues of content and measurement. *Soc. Indic. Res.* **2002**, *57*, 43–71. [CrossRef]

32. Sirgy, M.J. *Handbook of Quality-Of-Life Research: An Ethical Marketing Perspective*; Kluwer Academic: Dordrecht, The Netherlands, 2001.

33. Cheung, C.K.; Chan, R.K.H. Social capital as exchange: Its contribution to morale. *Soc. Indic. Res.* **2010**, *96*, 205–227. [CrossRef]

34. Lin, N. Building a network theory of social capital. *Connections* **1999**, *22*, 28–51.

35. Evans, P. Government action, social capital and development: Reviewing the evidence on synergy. *World Dev.* **1996**, *24*, 1119–1132. [CrossRef]

36. Kajanoja, J.; Simpura, J. (Eds.) *Social Capital-Global and Local Perspectives*; National Research and Development Centre for Welfare and Health, Government Institute for Economic Research, Helsinki, Vatt Publications: Floor Rockford, IL, USA, 2000.

37. Beugelsdijk, S.; Welzel, C. Dimensions and dynamics of national culture: Synthesizing Hofstede with Inglehart. *J. Cross Cult. Psychol.* **2018**, *49*, 1469–1505. [CrossRef]

38. Westlund, H. *Social Capital in the Knowledge Economy: Theory and Empirics*; Springer Science & Business Media: Berlin/Heidelberg, Germany, 2006.

39. Putnam, R. Bowling alone: America's declining social capital. *J. Democr.* **1995**, *6*, 65–78. [CrossRef]

40. Bjørnskov, C. The multiple facets of social capital. *Eur. J. Polit. Econ.* **2006**, *22*, 22–40. [CrossRef]

41. Leigh, A. Trust, inequality and ethnic heterogeneity. *Econ. Rec.* **2006**, *82*, 268–280. [CrossRef]

42. Pichler, F.; Wallace, C. Patterns of formal and informal social capital in Europe. *Eur. Soc. Rev.* **2007**, *23*, 423–435. [CrossRef]

43. Castells, M. *The City and the Grassroots: A Cross-Cultural Theory of Urban Social Movements (No. 7)*; University of California Press: Berkeley, CA, USA, 1983.

44. Stone, W. *Measuring Social Capital*; Research Paper; Australian Institute of Family Studies: Southgate Towers, Australia, 2001; p. 24.

45. Mayer, M. The onward sweep of social capital: Causes and consequences for understanding cities, communities and urban movements. *Int. J. Urban. Reg. Res.* **2003**, *27*, 110–132. [CrossRef]

46. Kearns, A. Social capital, regeneration and urban policy. In *Urban Renaissance? New Labour, Community and Urban Policy*; Imrie, R., Raco, M., Eds.; The Policy Press: Bristol, UK, 2003; pp. 37–60.

47. Osborne, M.; Sankey, K.; Wilson, B. (Eds.) *Social Capital, Lifelong Learning and the Management of Place: An International Perspective*; Routledge: London, UK; New York, NY, USA, 2007.

48. Ferragina, E. *Social Capital in Europe: A Comparative Regional Analysis*; Edward Elgar Publishing: Cheltnam, UK, 2012.

49. Jones, N.; Clark, J.R.A.; Panteli, M.; Proikaki, M.; Dimitrakopoulos, P.G. Local social capital and the acceptance of Protected Area policies: An empirical study of two Ramsar river delta ecosystems in northern Greece. *J. Environ. Manag.* **2012**, *96*, 55–63. [CrossRef] [PubMed]

50. Daskalopoulou, I. Sustainable urban living and social capital: Some evidence from crisis-hit Greece. In *City Networks: Collaboration and Planning for Health and Sustainability*; Karakitsiou, A., Migdalas, A., Rassia, S.T., Pardalos, P.M., Eds.; Springer: Cham, Switzerland, 2017; Volume 128, pp. 197–212.

51. Mayer, M.; Rankin, K.N. Social capital and (community) development: A north/south perspective. *Antipode* **2002**, *34*, 804–808. [CrossRef]

52. Greenberg, A.G.; Gullotta, T.P.; Bloom, M. (Eds.) *Social Capital and Community Well-Being: The Serve Here Initiative*; Springer: Berlin/Heidelberg, Germany, 2016.

53. Lochner, K.; Kawachi, I.; Kennedy, B.P. Social capital: A guide to its measurement. *Health Place* **1999**, *5*, 259–270. [CrossRef]

54. Mohnen, S.M.; Groenewegen, P.P.; Völker, B.G.M.; Flap, H.D. Neighborhood social capital and individual health. *Soc. Sci. Med.* **2010**, *72*, 660–667. [CrossRef]

55. Kitchen, P.; Williams, A.; Simone, D. Measuring social capital in Hamilton, Ontario. *Soc. Indic. Res.* **2012**, *108*, 215–238. [CrossRef]

56. Portney, K.E.; Berry, J.M. Mobilizing minority communities social capital and participation in urban neighborhoods. *Am. Behav. Sci.* **1997**, *40*, 632–644. [CrossRef]

57. Purdue, D. Neighborhood governance: Leadership, trust and social capital. *Urban. Stud.* **2001**, *38*, 2211–2224. [CrossRef]

58. Keating, M. Is there a regional level of government in Europe. In *Regions in Europe*; Routledge: Abingdon, UK, 2006; pp. 23–36.

59. Agger, A.; Jensen, J.O. Area-based initiatives—And their work in bonding, bridging and linking social capital. *Eur. Plan. Stud.* **2015**, *23*, 2045–2061. [CrossRef]

60. Leana, C.R.; Pil, F.K. Social capital and organizational performance: Evidence from urban public schools. *Organ. Sci.* **2006**, *17*, 353–366. [CrossRef]

61. DiPasquale, D.; Glaeser, E.L. Incentives and social capital: Are homeowners better citizens. *J. Urban. Econ.* **1999**, *45*, 354–384. [CrossRef]

62. Lyons, M.; Snoxell, S. Creating urban social capital: Some evidence from informal traders in Nairobi. *Urban. Stud.* **2005**, *42*, 1077–1097. [CrossRef]

63. Forrest, R.; Kearns, A. Social cohesion, social capital and the neighborhood. *Urban. Stud.* **2001**, *38*, 2125–2143. [CrossRef]

64. Hofferth, S.L.; Iceland, J. Social capital in rural and urban communities. *Rural Soc.* **1998**, *63*, 574–598. [CrossRef]

65. Wacquant, L.J. Negative social capital: State breakdown and social destitution in America's urban core. *Neth. J. Hous. Built Environ.* **1998**, *13*, 25–40. [CrossRef]

66. Brueckner, J.K.; Largey, A.G. Social interaction and urban sprawl. *J. Urban. Econ.* **2008**, *64*, 18–34. [CrossRef]

67. Tóth, B.I. Territorial capital: Theory, empirics and critical remarks. *Eur. Plan. Stud.* **2015**, *23*, 1327–1344. [CrossRef]

68. Sønderskov, K.M.; Dinesen, P.T. Trusting the state, trusting each other? The effect of institutional trust on social trust. *Political Behav.* **2016**, *38*, 179–202. [CrossRef]

69. Falk, I.; Kilpatrick, S. What is social capital? A study of interaction in a rural community. *Soc. Rural.* **2000**, *40*, 87–110. [CrossRef]

70. Van Der Gaag, M.; Snijders, T.A. The resource generator: Social capital quantification with concrete items. *Soc. Netw.* **2005**, *27*, 1–29. [CrossRef]

71. Habersetzer, A.; Grèzes-Bürcher, S.; Boschma, R.; Mayer, H. Enterprise-related social capital as a driver of firm growth in the periphery. *J. Rural Stud.* **2019**, *65*, 143–151. [CrossRef]

72. Daskalopoulou, I.; Petrou, A. Entrepreneurial growth expectations and information flows in networks. *J. Small Bus. Enterp. Dev.* **2010**, *17*, 334–349. [CrossRef]

73. Trigkas, M.; Partalidou, M.; Lazaridou, D. Trust and Other Historical Proxies of Social Capital: Do They Matter in Promoting Social Entrepreneurship in Greek Rural Areas. *J. Soc. Entrep.* **2020**, 1–20. [CrossRef]

74. Daskalopoulou, I.; Karakitsiou, A. On the stock of social capital in Greece: A multi-criteria analysis of its regional distribution. In Proceedings of the 17th Special Conference of the Hellenic Operational Research Society (HELORS) and the 13th Meeting on Multicriteria Decision Making, Serres, Greece, 4–6 April 2019.

75. Whiteley, P.F. Economic Growth and Social Capital. *Polit. Stud.* **2000**, *48*, 443–466. [CrossRef]

76. Hjerppe, R. *Social Capital and Economic Growth Revisited*; VATT Discussion Paper; Government Institute for Economic Research: Tokyo, Japan, 2003.

77. Kaasa, A. Effects of different dimensions of social capital on innovative activity: Evidence from Europe at the regional level. *Technovation* **2009**, *29*, 218–233. [CrossRef]

78. Petrakos, G.; Psycharis, Y. *Regional Development in Greece*; Kritiki: Athens, Greece, 2004.

79. Christofakis, M.; Papadaskalopoulos, A. The Growth Poles Strategy in regional planning: The recent experience of Greece. *Theor. Empir. Res. Urban. Manag.* **2011**, *6*, 5–20.

80. Goletsis, Y.; Chletsos, M. Measurement of development and regional disparities in Greek periphery: A multivariate approach. *Socio Econ. Plan. Sci.* **2011**, *45*, 174–183. [CrossRef]

81. Maltz, A. Exogenous endowment—Endogenous reference point. *Econ. J.* **2020**, *130*, 160–182. [CrossRef]

82. Kahneman, D.; Tversky, A. Loss aversion in riskless choice: A reference dependent model. *Q. J. Econ.* **1991**, *106*, 1039–1061.

83. Ortoleva, P. Status quo bias, multiple priors and uncertainty aversion. *Games Econ. Behav.* **2010**, *69*, 411–424. [CrossRef]

84. Barbos, A. Context effects: A representation of choices from categories. *J. Econ. Theory* **2010**, *145*, 1224–1243. [CrossRef]

85. Ok, E.A.; Ortoleva, P.; Riella, G. Revealed (P)Reference Theory. *Am. Econ. Rev.* **2015**, *105*, 299–321. [CrossRef]

86. Koszegi, B.; Rabin, M. A model of reference-dependent preferences. *Q. J. Econ.* **2006**, *121*, 1133–1165.

87.   Hwang, C.L.; Yoon, K. Methods for Multiple Attribute Decision Making. In *Multiple Attribute Decision Making. Lecture Notes in Economics and Mathematical Systems*; Springer: Berlin/Heidelberg, Germany, 1981; Volume 186.

88.   Celen, A. Comparative analysis of normalization procedures in TOPSIS method: With an application to Turkish deposit banking market. *Informatica* **2014**, *25*, 185–208. [CrossRef]

89.   Pavlicic, D.M. Normalization affects the results of MADM methods. *Yugosl. J. Oper. Res.* **2001**, *11*, 251–265.

90.   Vafaei, N.; Ribeiro, R.A.; Camarinha-Matos, L.M. Data normalisation techniques in decision making: Case study with TOPSIS method. *Int. J. Inf. Decis. Sci.* **2018**, *10*, 19–38. [CrossRef]

91.   Saaty, T.L. *The Analytic Hierarchy Process, Planning, Priority Setting, Resource Allocation*; Mc Graw-Hill: New York, NY, USA, 1980.

92.   Shannon, C.E. A mathematical theory of communication. *ACM Sigmobile Mob. Comput. Commun. Rev.* **2001**, *5*, 3–55. [CrossRef]

93.   Lyberaki, A.; Paraskevopoulos, C.J. Social capital measurement in Greece. In Proceedings of the International Conference of the Organisation for Economic Co-operation and Development (OECD), London, UK, 25–27 September 2002; pp. 25–27.

94.   Daskalopoulou, I. Social capital at the outburst of the economic crisis in Greece, 2008–2010. *Int. J. Bus. Econ. Sci. Appl. Res. Ijbesar* **2016**, *9*, 79–86.

95.   R Core Team. *R: A Language and Environment for Statistical Computing*; R Foundation for Statistical Computing: Vienna, Austria, 2019.

96.   Bigaret, S.; Hodgett, R.; Meyer, P.; Mironova, T.; Olteanu, A. Supporting the multi-criteria decision aiding process: R and the MCDA package. *Euro. J. Decis. Process.* **2017**, *5*, 169–194. [CrossRef]

97.   Bitros, G.C. From riches to rags or what went wrong in Greece. *J. Econ. Soc. Meas.* **2013**, *38*, 5–39. [CrossRef]