

A GISbased estimation of quality of life in italian regions

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ABSTRACT: In this article we build a new socio-economic indicator able to put together a series of variables from ISTAT-BES that are used to evaluate the level of economic, environmental, educational, and social life in the Italian regions and autonomous provinces in the period 2004-2016. The original part of the article is the construction of a new indicator i.e. SEQI able to harmonize social, economic, environmental and educational features of the quality of life. Methodologically we use Geographic Information System (GIS) and panel data to investigate the socio-economic quality of life in Italian regions. Our data suggest that the increase of socio-economic quality of life is associated to the reduction in poverty, the increase in Gross Domestic Product (GDP), the reduction in gross value added, the increase in employed, the reduction in working hours.

KEYWORDS: *socio-economic, spatial analysis, QGIS, well-being, panel data, regional economics*

I. INTRODUCTION

In this article we estimate the determination of quality of life. Quality of life has been synthesized with the presence of an indicator that considers socio-economic, education and environmental issues in the context of Italian regions and provinces. The socio-economic indicator has been built on the basis of ISTAT-BES data. To estimate the socio-economic indicator, we have used variables from Eurostat. The Italian regions and autonomous Provinces of Trento and Bolzano have been analyzed in the period 2004-2016. Our analysis has shown that the quality of life diminishes with the increasing number of people living in poverty or social exclusion, increases with GDP at current market prices, diminishes with gross value added at basic prices, increases with the number of persons employed, diminishes with the number of hours employed, increases with the level of household's income.

In the sequent part of the article we introduce the field analyzing why it is important to promote alternative metrics to evaluate the socio-economic conditions of the population and what are the theoretical roots of our analysis. In the third paragraph we analyze the methodology of the metric results. In the fourth paragraph we present the conclusions.

II. THE SOCIO-ECONOMIC QUESTION OF QUALITY OF LIFE

The socio-economics of happiness and well-being is a complex field based on a multidisciplinary approach that considers not only economic, financial and monetary indicators, but also psychological, sociological, institutional and environmental elements. It is possible to define the socio-economics of happiness essentially as an interdisciplinary and multidisciplinary field that is grounded either in the evolution of theories either in the large amount of data. The question of happiness has been introduced in the economic debate during the 60s when politicians and academics discovered the absence of a positive relationship between the increasing value of gross domestic product and the level of life satisfaction of the population and started to criticize the ability of standard national accountability to describe the real wealth of a nation. In this sense for example, emblematic is the discourse of Robert Francis Kennedy (Kennedy, 1968), in which the senator criticizes the role of Gross National Product-GNP¹ with these words:

« [...] the gross national product does not allow for the health of our children, the quality of their education or the joy of their play. It does not include the beauty of our poetry or the strength of our marriages, the intelligence of our public debate or the integrity of our public officials. It measures neither our wit nor our courage, neither our wisdom nor our learning, neither our compassion nor our devotion to our country, it measures everything in short, except that which makes life worthwhile. And it can tell us everything about America except why we are proud that we are Americans. » (Kennedy, 1968)

The critique in respect of national account systems has created a relevant precedent in the political and

¹ What is said here for the Gross National Product-GNP is also valid for Gross Domestic Product-GDP and annexed definitions.

economic debate that has questioned the validity of standard measure for the metrical computations of non-GNP or non-GDP² variables such as for example happiness, well-being or the socio-economic quality of life. Eight years later the discourse of the US politician Robert Kennedy, the economist Richard Easterlin discovered the “Easterlin Paradox”(Easterlin, 1974). The Easterlin Paradox states the existence of a negative relation between the level of income and the level of happiness over a certain level of income. It means that income and happiness grow together until a certain point, but over that point, even marginal increase in income, does not generate positive improvement in happiness³.

So, the validity of classical economic indicators, such as for example GDP, to estimate the level of happiness and well-being has been criticized by many parts either in economic science, either in other social sciences. Due to this critique many governments have realized important innovations in the context of their national accountability systems. It is the case of the Stiglitz-Sen-Fitoussi commission (Stiglitz, et al., 2009) that have studied new indicators to evaluate the level of happiness and well-being among the population from a public point of view.

Based on these changes that have been introduced in the public debate since the 60s, our work tries to estimate a new indicator that is the Socio-Economic Quality Indicator-SEQUI, that quantifies on a regional basis the level of economic, environmental, educational and inequality condition in Italian regions and provinces. To conduct this analysis, we collect data from BES-ISTAT and Eurostat and we apply a panel data methodology and a GIS-analysis to estimate the level of dependent variables of our independent variable.

The critique to national statistics and the evolution of new methodologies based on data and algorithms.

The critique to national statistics is a widespread movement of politicians, academics and professionals that is actively engaged in the changing process of accountability. In effect the development of new data generated in connection with the evolution of internet and informatics has created new relevant opportunity to monitor the condition of individuals. The distribution of data, especially in the form of big data based on individual usage of smartphones, computers and internet in general, has increased the possibility to know not only formal data but also informal data that are associated with rational and emotional behavior. In effect the traditional theory of economic choice and economic behavior has always considered the presence of strong assumption of rationality, and only recently new definitions of behavior and choice have been introduced since the idea of bounded rationality and the practice of behavioral analysis. The critique to national accountability is effectively a critique to the ability of formal statistics to describe the mechanism of choice of individuals and collectivities. In this sense there are new variables that have been introduced by national statistics. For example, the Italian Institute of National Statistics that is ISTAT has developed a series of indicators that can be used to evaluate the mood of Italians (ISTAT, 2020).

But the main innovation that ISTAT has introduced in the context of national accounting is a new series of periodic records that is the BES-Report, that we use in the estimation of our article, and that has a detailed representation of a series of variables that are able to capture the non-GDP side of the economic and social life. In particular the BES-ISTAT has been built with the sequent series of macro-variables that are organized in the form of micro-variables and that are: Health, Instruction and Formation, Work and Lifetime balance, Economic Wellness, Social Relations, Politics and Institutions, Defense, Subjective Wellness, Landscape and Cultural Heritage, Environment, Innovation Research and Creativity, Quality of Services. The adoption of the BES-ISTAT can be considered as one of the main innovations in the context of national statistics in the sense of overcoming the limitation of the GDP based statistics towards more data and indicators able to shed light on non-monetary and financial statistics.

The choice of a particular set of data and variables is implicitly a way to orient the public opinion and the policy makers to adopt certain types of policies. For example, if the national accountability starts to collect data relative to poverty and social exclusion there is an increasing probability that policy makers and public opinion can implement effectively policies based on the metric analysis of poverty and social exclusion datasets. Sometimes data are collected by national statistics with the explicit necessity to inspire particularly specific policies. One example can be the unemployment benefit that can be automatically paid from the public administration if some kind of metrics applies relatively to income statements and taxes. In this sense the introduction of BES-ISTAT database can be considered a clear innovation able to inspire new active policies.

Even if the movement of critique of the GDP can be considered as one of the newest and vast innovation in the national accountability able to shed light also in the sense of the creation of public policies there are also critiques in respect to this non-GDP based statistics. The main critique consists in the fact that data collected are not objectively based on the presence of a clear method of detection but are based on questionnaires that are

² In this context we do not want to criticize the important work of the many economists, demographers and statisticians that have built the national statistical system such as for example Simon Kuznets (Kuznets, 1952) in his various contributions (Kuznets, 1937).

³ But the Easterlin Paradox has been strongly criticized not only on a theoretical point of view but also on an empirical point of view. In effect either economists (Stevenson & Wolfers, 2008), either psychologists (Diener, et al., 2013) and sociologists (Veenhoven & Vergunst, 2014) have demonstrated the positive relation between the increasing of income and the increasing in the level of happiness.

based on opinions, and contingent moods and behaviors. For example, the same idea of the detection of the happiness is realized asking to interviewed people what is their mood in that day or in the 24 hours precedent. Data have suggested that generally it has been verified that poor people tend to declare to be more happy than rich people (Deaton, 2013). The problem in this case is in the ability of the population to be highly efficient in self-assessment, that is something highly improbable. In effect in this case people perform some kind of cognitive bias very similar to that analyzed in the Prospect Theory (Tversky & Kahneman, 1992). This gap in the self-assessment that can be determined in the context of questionnaires-based data can lead to imperfections that can reduce the level of credibility of the data.

The creation of an immaterial economy. Another element that is important in the definition of the new indicators different from the GDP-logic consists in the development of the knowledge society and knowledge economics, and in the evolution of the immaterial production of goods and services. In fact, for example, GDP is not able to shed light on the mechanism that generate knowledge in the society. The production of knowledge in effect mobilize economic forces such as for example education, social and human capital that can do not enter effectively in the computation of GDP. To evaluate the relevance of immaterial economics that is crucial to contemporary economic systems it is necessary to consider intangible services and products such as for example know how, the presence of institutions, the evaluation of good governance and government, fair justice and the diffusion of civil and political rights that are not fully computed in the analysis of GDP. One of the main problems in the definition of knowledge and in its analysis in respect to GDP is the fact that knowledge seems to be more similar to a stock and less similar of a flow. This means that knowledge is a kind of good that is only partially included in the GDP. In synthesis we can say that knowledge is based on the sequent relation:

$$KnowledgeEconomy_{it} = a_1(StockOfKnowledge)_{it} + a_2(InnovationOfKnowledge)_{it}$$

While the innovation of knowledge can be certainly considered as a part of the GDP, the stock of knowledge cannot be considered as a part of GDP. The main reason for this distinction is in the fact that the stock of knowledge is accumulated over multiple periods and cannot be effectively attributed to a single year. On the contrary the innovation of knowledge can be considered as produced in the context of the single financial exercise. We can be more precise in the context of the distinction between stock of knowledge and innovation of knowledge. For example, innovation of knowledge included in the GDP, can be better understood considering the productive value that is realized in startups, and in the research and development departments either in public and in private enterprises. GDP is not able to give an adequate economic evaluation of the relevance of knowledge especially in the sense of the stock of knowledge for the fact that the stock of knowledge is in large part a heritage of previous economic development and does not enter effectively in the gross domestic product.

The necessity to use a multidisciplinary approach. The evaluation of quality of life requires the presence of a multidisciplinary analysis. Our index put together different elements that contribute to quality of life, happiness and well-being. In particular we analyze socio-economic, educational and environmental elements to determine the quality of life among Italian regions. The socio-economic qualitative analysis put together 4 different elements (ISTAT, 2020)

$$SEQI_{it} = [a_1(WellnessAndMinimalEconomicConditions)_{it} + a_2EnvironmentCompositeIndex_{it} + a_3EducationAndTrainingCompositeIndex_{it} + a_4IncomeAndInequality_{it}]^{1/4}$$

With i = ItalianRegionsAndAutonomousProvinces and t = [2004; 2014]

The four elements of the SEQI analysis	
<i>WellnessandMinimalEconomicConditions</i>	They represent a set of variables considering the average income available, the inequality of disposable income, the index of severe material deprivation, low quality home index, index of great economic difficulty and very low labor intensity. The main idea of this index is to find ways to evaluate the degree of Economic Conditions in the Italian regions and autonomous provinces.
<i>EnvironmentCompositeIndex</i>	It is an index that considers a series of environmental issues such as wastewater treatment, transfer of municipal waste to landfill, areas of particular naturalistic interests, energy from renewal sources, and satisfaction resulting from environmental situations. This index is able to evaluate the role of environment in increasing the quality of existence.

<i>EducationandTrainingCompositeIndex</i>	This index refers to a set of variables that contemplate the participation in kindergarten, people with at least a high school diploma, people who have an academic degree, early exit from educational and training systems and participation in continuing education. The index considers the role of education in the Italian regions and autonomous provinces.
<i>IncomeandInequality</i>	This element is based on the summation of two variables: the average income available and inequality index of disposable income. This index considers the relationship between income and inequality, where the income component is considered as an augmenting component and the inequality component is subtracted to the equation.

Where:

- $WellnessAndMinimalEconomicConditions_{it} = a_1(AverageIncomeAvailable)_{it} + a_2(InequalityIndexOfDisposaleIncome)_{it} - a_3(IndexOfSevereMaterialDeprivation)_{it} - a_4(LowQualityHomeIndex)_{it} - a_5(IndexOfGreatEconomicDifficulty)_{it} - a_6(VeryLowLaborIntensity)_{it}$
- $EnvironmentCompositeIndex_{it} = a_1(WastewaterTreatment)_{it} - a_2(TransferOfMunicipalWasteToLandfills)_{it} + a_3(AreasOfParticularNaturalisticInterest)_{it} + a_4(EnergyFromRenewableSources)_{it} + a_5(SatisfactionWithTheEnvironmentalSituation)_{it}$
- $EducationAndTrainingCompositeIndex_{it} = a_1(ParticipationInKindergarten)_{it} + a_2(PeopleWithAtLeastAHighSchoolDiploma)_{it} + a_3(PeopleWhoHaveAUniversityDegree)_{it} - a_4(EarlyExitFromTheEducationAndTrainingSystem)_{it} + a_5(ParticipationInContinuingEducation)_{it}$
- $IncomeAndInequality_{it} = a_1(AverageIncomeAvailable)_{it} - a_2(InequalityIndexOfDisposaleIncome)_{it}$

And we have that:

$$SEQUI_{it} = [2a_1(AverageIncomeAvailable)_{it} - 2a_2(InequalityIndexOfDisposaleIncome)_{it} - a_3(IndexOfSevereMaterialDeprivation)_{it} - a_4(LowQualityHomeIndex)_{it} - a_5(IndexOfGreatEconomicDifficulty)_{it} - a_6(VeryLowLaborIntensity)_{it} + a_7(WastewaterTreatment)_{it} - a_8(TransferOfMunicipalWasteToLandfills)_{it} + a_9(AreasOfParticularNaturalisticInterest)_{it} + a_{10}(EnergyFromRenewableSources)_{it} + a_{11}(SatisfactionWithTheEnvironmentalSituation)_{it} + a_{12}(ParticipationInKindergarten)_{it} + a_{13}(PeopleWithAtLeastAHighSchoolDiploma)_{it} + a_{14}(PeopleWhoHaveAUniversityDegree)_{it} - a_{15}(EarlyExitFromTheEducationAndTrainingSystem)_{it} + a_{16}(ParticipationInContinuingEducation)_{it}]^{1/4}$$

But even if this is the composition of equations in our model the equation that we effectively estimate is indicated as follows:

$$SEQUI_{it} = [a_1(WellnessAndMinimalEconomicConditions)_{it} + a_2(EnvironmentCompositeIndex)_{it} + a_3(EducationAndTrainingCompositeIndex)_{it} + a_4(IncomeAndInequality)_{it}]^{1/4}$$

With i = ItalianRegionsAndAutonomousProvinces and t = [2004; 2014]

In our analysis the SEQUI equation is able to investigate the complexity of the quality of life in a heterogeneous scenario where, economic, social, environmental and educational variables are investigated by means of a common index.

The question of endogeneity in evaluation social and economic phenomena. One of the main problems in socio-economic studies is the question of endogeneity. Especially in evaluating the complexity of the socio-economic analysis it is essential to determine the existing relationships trying to reduce the degree of endogeneity. But this possibility is not effectively feasible due to the fact that there is an inner strong interdependence in the realm of socio-economic studies. However, the presence of endogeneity in the socio-economic analysis should not be considered as an obstacle in the path to explain non-causal relations and epistemological association among different variables in the application of a metric model. For these motivations, considering the limitations of the analysis that are included in the “*inner endogeneity*” we have performed the model trying to verify the presence of useful relationships, not only statistically, but also theoretically, in order to describe the socio-economic determinant of quality of life in Italian regions and provinces.

Polarization of society in the contemporary economics. The global economic system seems to be oriented to an increase in inequality. In this sense many economists have proposed the metaphor of the 1% (Stiglitz, 2011). The distribution of wealth especially in the United States is oriented to a strong form of inequality. Inequality creates the conditions of social exclusion, poverty, financial fragility and increases the presence of working poors. There are new forms of social exclusion and economic deprivation that not only are based on race, sexual and age discrimination, but that are also based on the role in the job market. For example, the presence of the gender pay gap, the diffusion of working poors, and the distribution of NEET-Not in Employment Education and Training, create new social classes based on financial fragility and social exclusion. The reduction of the programs of welfare state that have characterized the post-WWII have reduced the ability of the State to intervene in the reduction of inequality and discrimination. The role of the State in promoting economic equality cannot be delegated to third parties, such as associations, foundations, charities and other kind of economic organizations having the scope to create better social outcome. On the contrary, the role of the State should go together with the role of the third sector in the promotion of social equality, creating a model based on three forces each of which has a specific objective:

- ***The state:*** with its ability to create public goods for the population especially in the sector of education, health, transportation, pensions funds, social assistance, contrasting at poverty, reduction of social exclusion and other social relevant outputs associated to the democratic state in the liberal economic order. The legitimacy of the State and its ability to fully operate as an economic actor has been strongly criticized either on the base of political and institutional views either by financial constraints and the raising of public debt that has reduced the ability to perform political economies devoted to social, liberal and democratic outcomes. For example in the United Europe the possibility of the single state to intervene in realizing industrial political economy is strongly reduced due to the presence of norms that are in the European treaties that reduce the possibility to national state to intervene even in the case of failure of too big to fail corporations. The reduction of the role of the state has also modified the definition of the presence of corporations that can be saved in the sense of national interest. The crisis of the national state and the rising of super national powers have reduced the possibility to implement policies devoted to save national assets, employment and either some public goods such as financial stability. The financial role of the state has been reduced and the global interdependence of national debts has increased the probability of the manifestation of global crisis based on interdependent financial systems.
- ***The market:*** with its ability to generate production and wealth to create goods and services, to apply technologies for the benefit of consumers and for the growth of economic organizations. The market has the goal of making the pie bigger without having consideration about the presence of distributional mechanism of wealth and with indifference in respect to social valuable objective and political oriented ends. The problem of the market is also the fact the periodically the market fails due to the presence of crisis either informational either institutional. As noble prize winner Stiglitz says “*Markets do not exist in a vacuum*” (Stiglitz, 2018) this means that the presence of market requires the diffusion of a certain cultural and institutional conditions that can prevent the manifestation of economic and financial crisis. But markets tend to fail repeatedly for different motivations generally associated to a misallocation of resources either on a, financial, institutional or informational point of view.
- ***The third sector:*** that is complex structure based on associations, foundations, and not-for profit organizations having the ability to develop new methodology to offer social and public goods in particular with respect to poors and against social and financial exclusion. The third sector is a vast area in the realm of sociological organizations and institutions and it comprehends also microcredit institutions, cooperative banks, stakeholder-oriented organizations, credit unions, cooperative of workers and professionals, and various type of charities. In particular in the Anglo-Saxon capitalism a relevant part of the financial development of the economic system is based on the presence of philanthropy that generally is associated with organizations based on massive wealth accumulation, creating a vast environment of heterogeneous not for profit organizations that operate in different fields i.e. health, education, housing and in contrast with poverty and social exclusion. The role of the third sector is particularly important especially in the case of a crisis when markets fail and the State has not sufficient resources to assist the population. In these conditions individuals and families rediscover the

role of communities, of strong and weak relationships, and the role of social order and solidarity as a public good (Rajan, 2019).

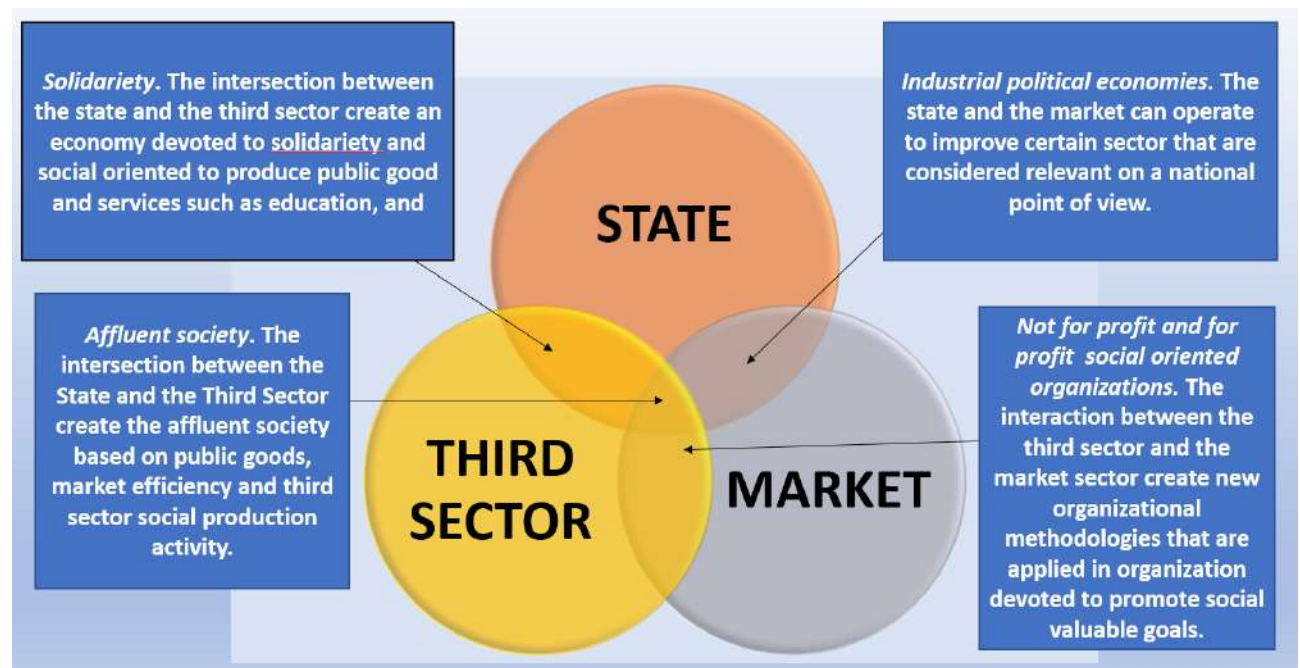


Figure 1. The relation between the State, the Market and the Third Sector. The affluent society is verified when the State, the market and the Third Sector operate efficiently in coordination creating economic growth, public goods, and social oriented not-for profit organizations.

Happiness, well-being, Eudaimonia. Happiness, Well-being and Eudaimonia are generally associated to the idea of quality of life, and even if they are strictly interconnected, they are characterized by epistemological differences that can be better understood in an etymological analysis. In the following part we analyze these concepts based on their deeper meaning and cultural heritage.

- **Happiness:** the word happiness is based on the two words happy+ness (Dictionary, 2020). Happy in particular means to be lucky and prosperous. Being happy means having a good fortune and a good chance. It is clear that being happy is neither based on human virtues neither on any kind of cultural and political effort or merit. Happiness in this sense is independent from social and institutional relationships, either if the presence of happiness does not exclude the probability that there is some kind of fortune in the realm of social and human interaction. But, in the general sense, on an etymological point of view, being happy does not indicate any kind of moral, ethical and political achievement, any particular engagement either on a democratic or institutional point of view. We can say that being happy is a condition of the lucky people and the happiest human being is the luckiest human being independently from any kind of virtues. There is no merit in being happy, no path that a person can follow to become happy. Being happy seems more related on a gift that has been received by a person independently from her action. Furthermore, the definition of happiness as lucky and good fortune seems to be more applicable to individuals instead of groups or communities. In this sense all the political theory that theorizes the presence of public happiness are not feasible and not usable in this context. For example, some definition of happiness as public good cannot be applied if we define happiness in the etymological sense of being lucky, since the nations that are lucky, can be favored by external factors that are independent from political economies and from choices performed from institutional policy makers. Italian political scientist and social reformer Pietro Verri (Verri, 2017) wrote about the presence of political economies that are able to determine and produce the maximum amount of happiness in the public domain. These ideas of public happiness are not applicable in the case of happiness in the sense of being lucky due to the fact that being lucky is not something that can be organized institutionally or that can constitute the object of a policy maker. In this sense happiness is something for individuals, that can be happy or lucky without the intervention of policy makers, without communities and independently from moral and ethical virtues. The conception of happiness as being lucky can be considered as based on ethical, moral, social and political indifference. Being happy is something that happens to lucky people, and lucky people are lucky due to variables that are independent from moral, political, social and institutional characteristics.

- **Well-being:** is a concept more complex than happiness. Well-being in particular is associated to life

satisfaction and with a series of physical and psychological states that are not independent from the conditions of others. The main difference between well-being and happiness is the fact that while happiness is potentially feasible at an individual level since the fact that being lucky is not necessarily a pro-communitarian or pro-societal event, well-being requires the presence of the alterity. Even if there are some elements that are “individualistic” (Ryff & Singer, 2006) in well-being such as for example self-acceptance, personal growth, purpose in life and autonomy, they are not effectively individual or selfish, since they require the presence of other persons to be effectively exercised. Or in other words we can say that while happiness is a lucky condition that can be purely selfish, the same cannot be realized in the case of wellbeing that generally requires the presence of others. Well-being can be otherwise defined as a non-selfish individualistic behavior that can promote social interactions. Another relevant difference between happiness and wellbeing is in the fact that wellbeing is strongly associated in respect to psychological and emotional healthy state, while in the case of happiness in the fact of being lucky there are no psychological, emotional or relational pre-conditions. Due to its definition it is easier to create the conditions for a definition of wellbeing that can be used to inspire economic policies.

- **Eudaimonia:** It is a Greek concept that has been introduced in Aristotelian philosophy. Eudaimonia is a complex world that means the presence of a good minor divinity that defends or inspires the human being. But even if there is theological and divinity base of the term eudaimonia the development of the idea of eudaimonia in the Greek philosophy, especially Aristotelian (Kraut, 2018), cannot be ascribed in the context of theological studies but in the realm of ethics and moral philosophy. The state of eudaimonia is feasible for humans, and they can behave and become such as minor divinity or in other words, the presence of eudaimonia can be considered as a methodology by which the person can reach a sort of quasi-divine status. At this point a question arises: how it is possible to acquire the benefits of eudaimonia? It is possible through a good life that can be reached by applying virtues. In effect the idea of eudaimonia can be considered in its connection with the idea of virtues considered either on an individual point of view either on the social point of view. And in particular eudaimonia requires civil and political virtues that are also compatible in respect to the life of communities and families. For example, having friends, having children, practicing the social and civil virtues, are methodologies to make the eudaimonia arise. There is a perfect compatibility among the development of eudaimonia for individuals and the harmonious development of society. In effect if the individuals are able to improve their eudaimonia, since they need to strengthen social relations, then also the social capital can be enriched and also the society and the political communities can increase their level. So, eudaimonia is neither individualistic, neither selfish, but requires human and social relations and the exercise of private and public virtues.

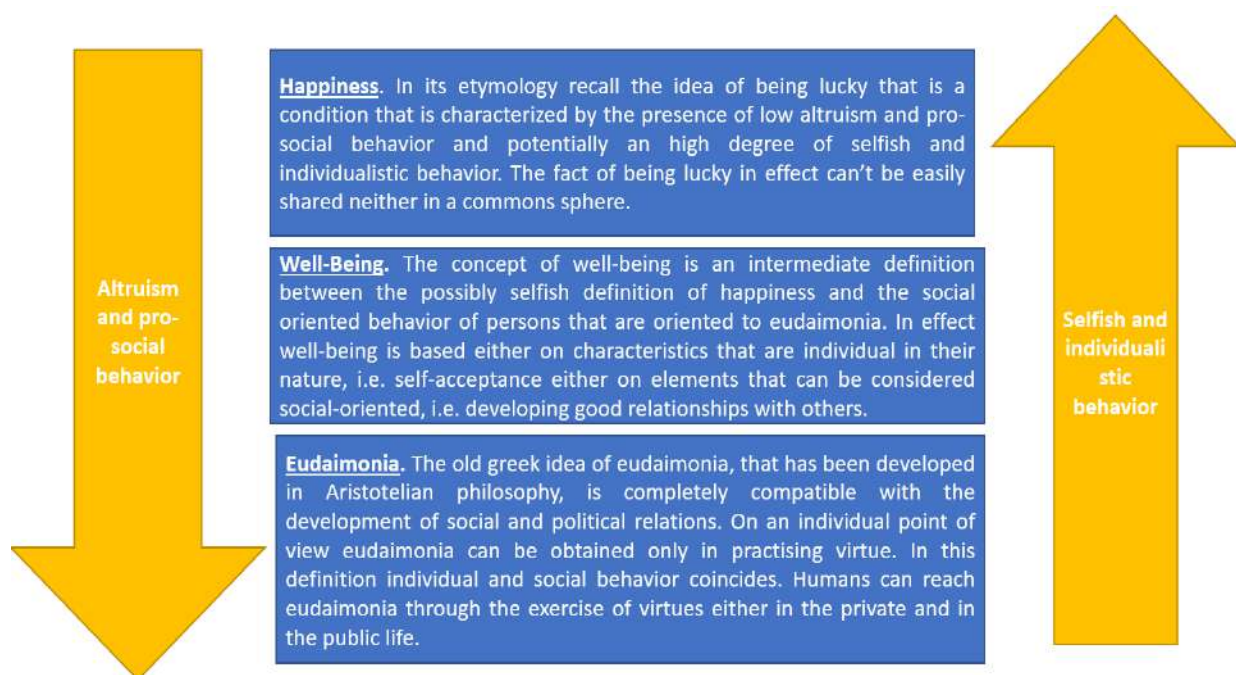


Figure 2. The relation between happiness, well-being and eudaimonia in respect to altruism and social behaviors on the left and on the sense of selfish and individualistic behavior on the right.

In this sense we can say that the definition of quality of life has elements of happiness, well-being and eudaimonia. In particular there is a component of being lucky in the quality of life that is common with happiness and this is the fact that quality of life is in a certain sense a dimension of being lucky. For example, the fact of living in a certain territory is certain a sort of lucky. In effect, people that lives in the more productive italian regions and provinces have high levels of quality of life and this can be effectively considered as a dimension of being lucky in the sense of happiness. But, quality of life has also something in common with the idea of well-being for the fact that it depends either from individual perceptions and personal effort either from social and inter-personal interactions. Quality of life, as well-being, depends either from psychological factors either from social and relational elements. In this sense quality of life can be considered as a measure that capture many aspects of the definition of well-being. Finally, there is also a positive connection between the presence of quality of life and eudaimonia especially in the sense of participating in social and political life. In effect the social dimension of the quality of life can be strongly associated with the complex set of relations that are generally associated with the idea of good life in the sense of eudaimonia.

Anyway there are many others elements that can be considered as relevant in the evaluation of quality of life such as the increasing individualism in the western society, the diffusion of loneliness, the widespread discrimination and marginalization especially in high income countries such as US, the presence of working poors and the diffusion of NEETs.

III. METHOD

The analysis was carried out through GIS-based tools, specifically QGIS(Team, 2020).In particular, all input information was imported into GIS environment and accordingly processed as described below.Socio-economic information plays an important role in defining economic policies affecting the main areas of quality of life.

For our study, socio-economic indicators were obtained from the BES Report (ISTAT, 2020). Data were collected for the entire Italian administrative territory, divided into 15 regions and 5 autonomous regions, from 2004 to 2016.Specifically, the following indicators were selected: minimum conditions for wellbeing-mCW, composite environment-CEn, composite education-CEd, income and inequality-InI.A Socioeconomic Quality Index was hence obtained by combining selected indicators based on the following equation:

$$SEI = (mCW \times CEn \times CEd \times InI)^{1/4}$$

In particular, the SEI index was calculated by means of an overlaying process into GIS consisting in the product of sub-layers. The calculation is based on the geometric mean of considered environmental and socio-economic parameters (Coscarelli, et al., 2016). Values were normalized by dividing the difference between a value and the minimum result by the maximum minus the minimum, allowing them to take on values between 0 and 1. Afterwards values have been classified following the equal-size scheme. This allows for the comparison among different maps (see V. APPENDIX).

We have matched the data from the Istat BES database with data from Eurostat database affecting the role of poverty, financial fragility and other measures of inequality and socio-economic discrimination.

We found estimate the following equation:

$$SEI_{it} = (mCW * CEn * CEd * InI)^{\frac{1}{4}} \\ = a_1 + b_1A18_{it} + b_2A20_{it} + b_3A23_{it} + b_4A25_{it} + b_5A28_{it} + b_6A29_{it} + b_6A30_{it}$$

We found that the measure of socio-economic quality is associated as follows:

- Increases with the level of severe material deprivation;
- Diminishes with the increasing of the people leaving in poverty or social exclusion
- Increases with gross domestic product at current markets;
- Diminishes with the value of gross value added at basic prices;
- Increases with the number of persons employed;
- Diminishes with the number of hours employed;
- Increases with the level of household's income.

All the results are coherent with the theory with the exception of the positive relation between the level of SEI and the level of material deprivation. The results are coherent either with panel data with fixed effects, with panel data with random effects, with OLS and Weighted OLS-WLS.

IV. CONCLUSION

As shown in our analysis, the estimation of quality of life is associated with a complex cultural and political movement that has tried to modify the role of national statistics and to evaluate individual and collective non-economic factors that are correlated with economic performances. The original part of the article is the

construction of a new indicator i.e. SEQI able to synthesize social, economic, environmental and educational features of the quality of life. In particular we have analyzed the role of quality of life with respect to some basic concepts such as happiness, well-being and eudaimonia. Quality of life is a complex element not easy to be understood without controlling for a heterogeneous and complex set of variables. Our results show that quality of life decreases with the increase of the number of people living in poverty or social exclusion, the increase in gross domestic product at current markets, while diminishes with gross value added at basis prices, increases with the number of persons employed, diminishes with the number of hours employed, increases with the level of household's income.

V. APPENDIX

In the sequent part we present the results of our analysis.

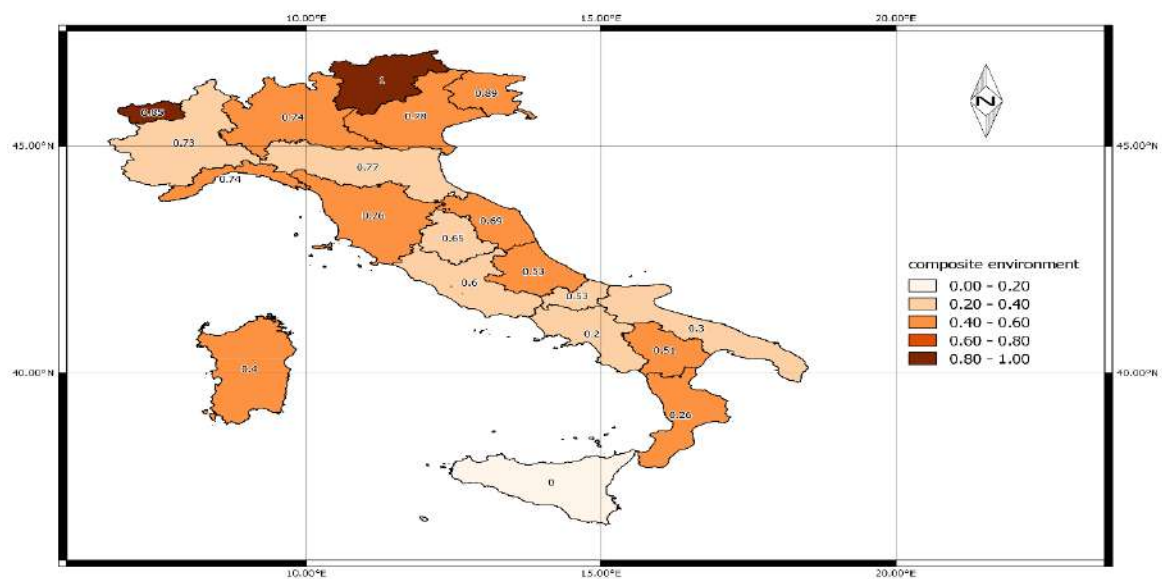


Figura 3. Composite environment indicator of Italy. Normalized values are shown.

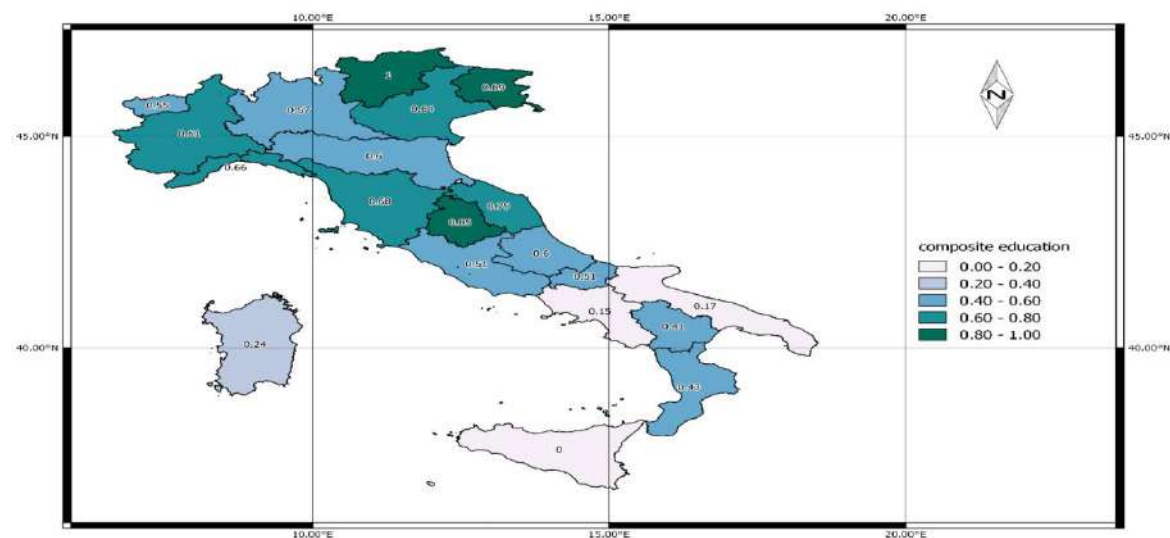


Figura 4. Composite education indicator of Italy. Normalized values are shown.

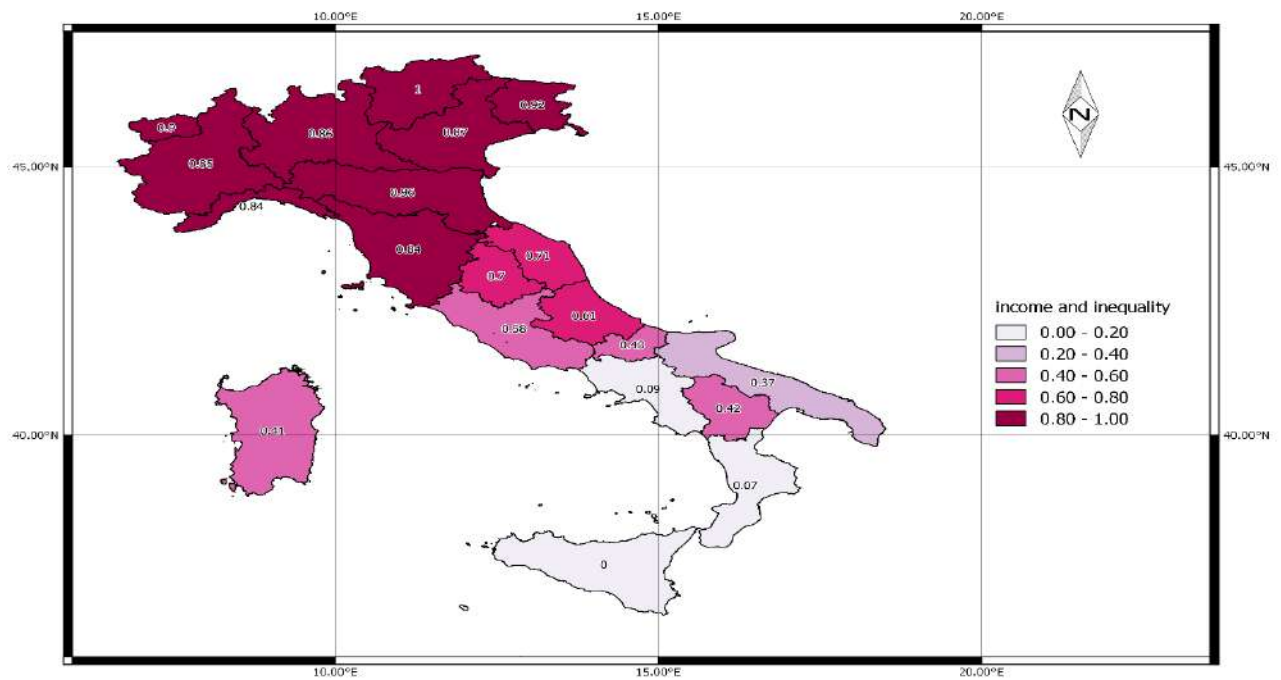


Figura 5..Income and inequality indicator of Italy. Normalized values are shown.

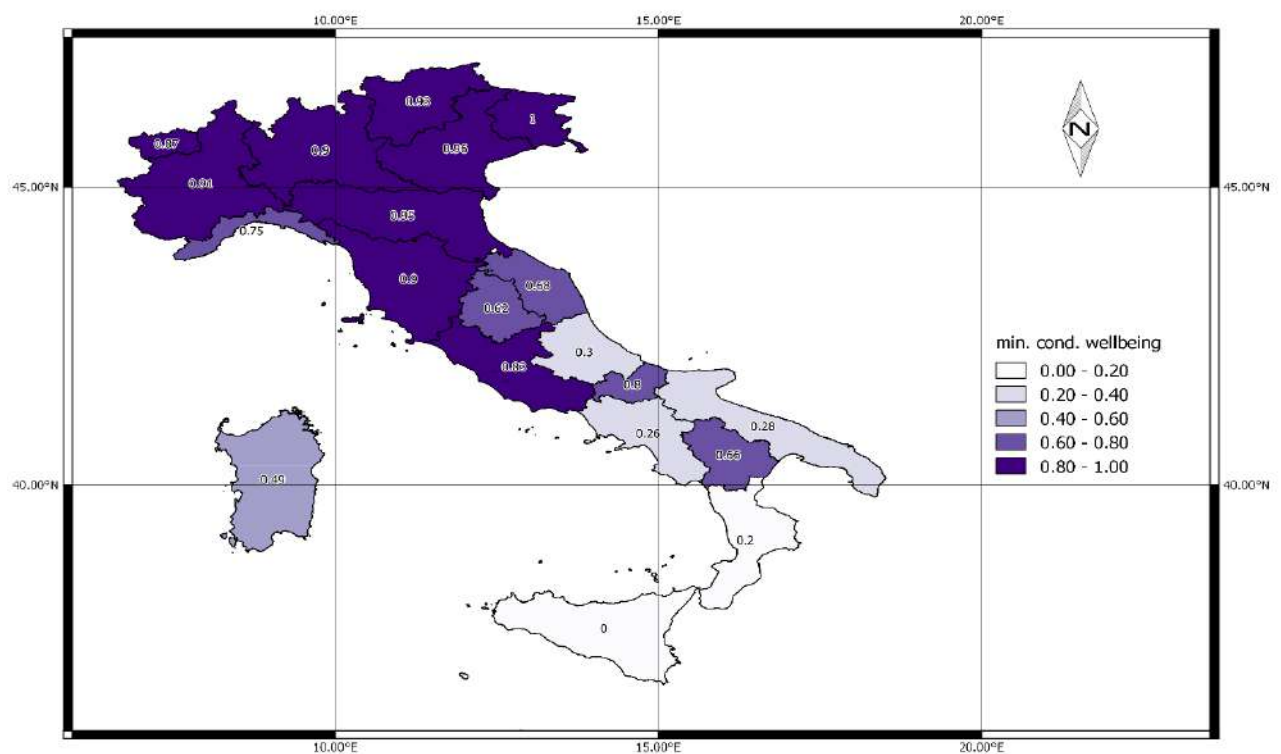


Figura 6. Minimum conditions for wellbeing of Italy. Normalized values are shown.

Estimation of the quality of life in italian regions and provinces								
Models	Fixed effects		Random Effects		Pooled OLS		WLS	
Estimation	<i>Coefficient</i>	<i>P-value</i>	<i>Coefficient</i>	<i>P-value</i>	<i>Coefficient</i>	<i>P-value</i>	<i>Coefficient</i>	<i>P-value</i>
Constant	98,934	***	98,8285	***	98,8007	***	100,598	***
A18	2,413600	***	2,37305	***	2,36146	***	2,4779	***
A20	-1,26323	***	-1,24435	***	-1,23915	***	-1,32042	***
A23	0,008684	***	0,00825745	***	0,00810725	***	0,00889855	***
A25	-0,0100486	***	-0,00958039	***	-0,00941399	***	-0,0101951	***
A28	0,243818	***	0,243604	***	0,243298	***	0,248264	***
A29	-0,000147497	***	-0,000147369	***	-0,00014719 2	***	-0,0001496 93	***
A30	0,000728	*	0,000736056	*	0,000737112	*	0,00058718	*
N	260		260		260		260	
T	13		13		13		13	
Schwartz	2350,04		2240,385		2240,379		781,4034	
Akaike	2246,78		2211,9		2211,894		752,918	

Figura 7. Estimation of quality of life in italian regions and provinces.

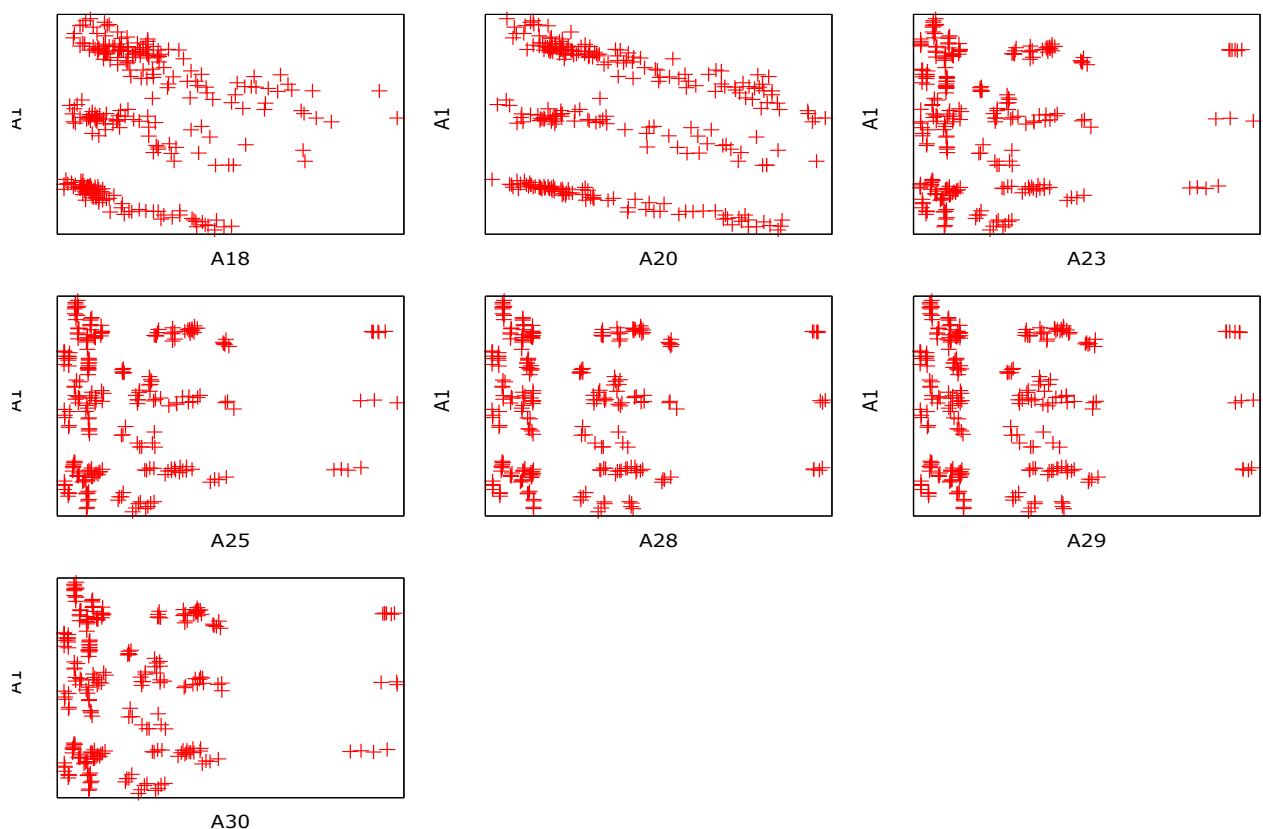


Figura 8. Dependent variables in respect to independent variable.

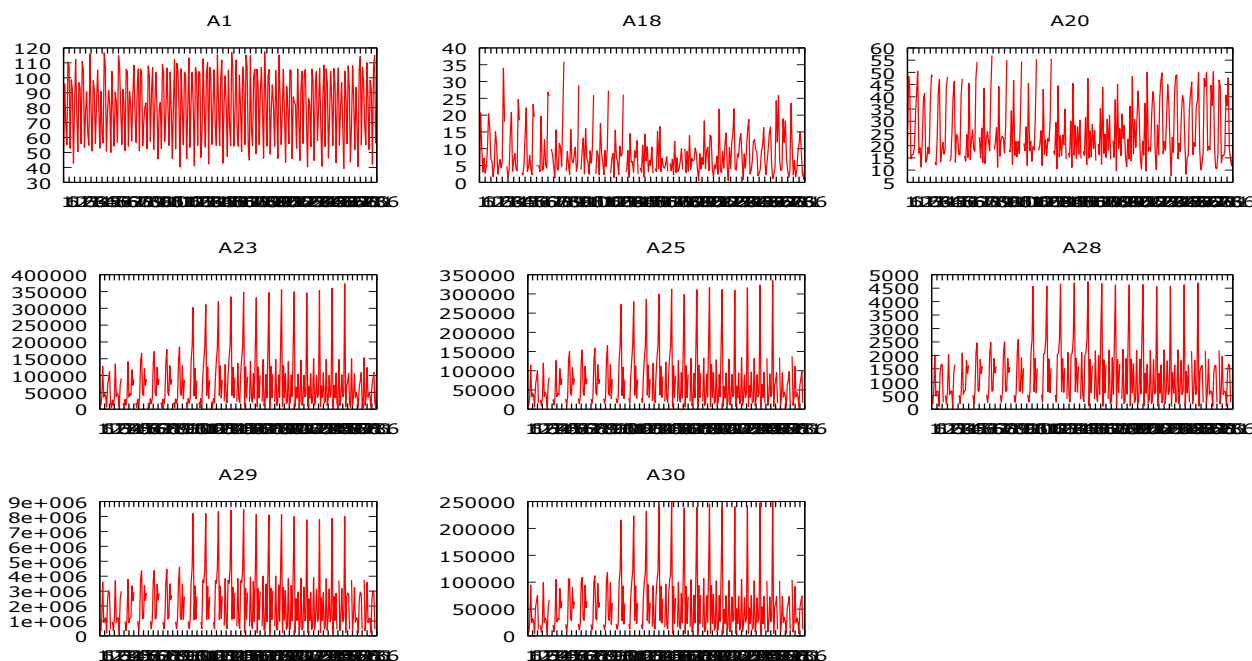


Figure 9. Times series analysis of variables.

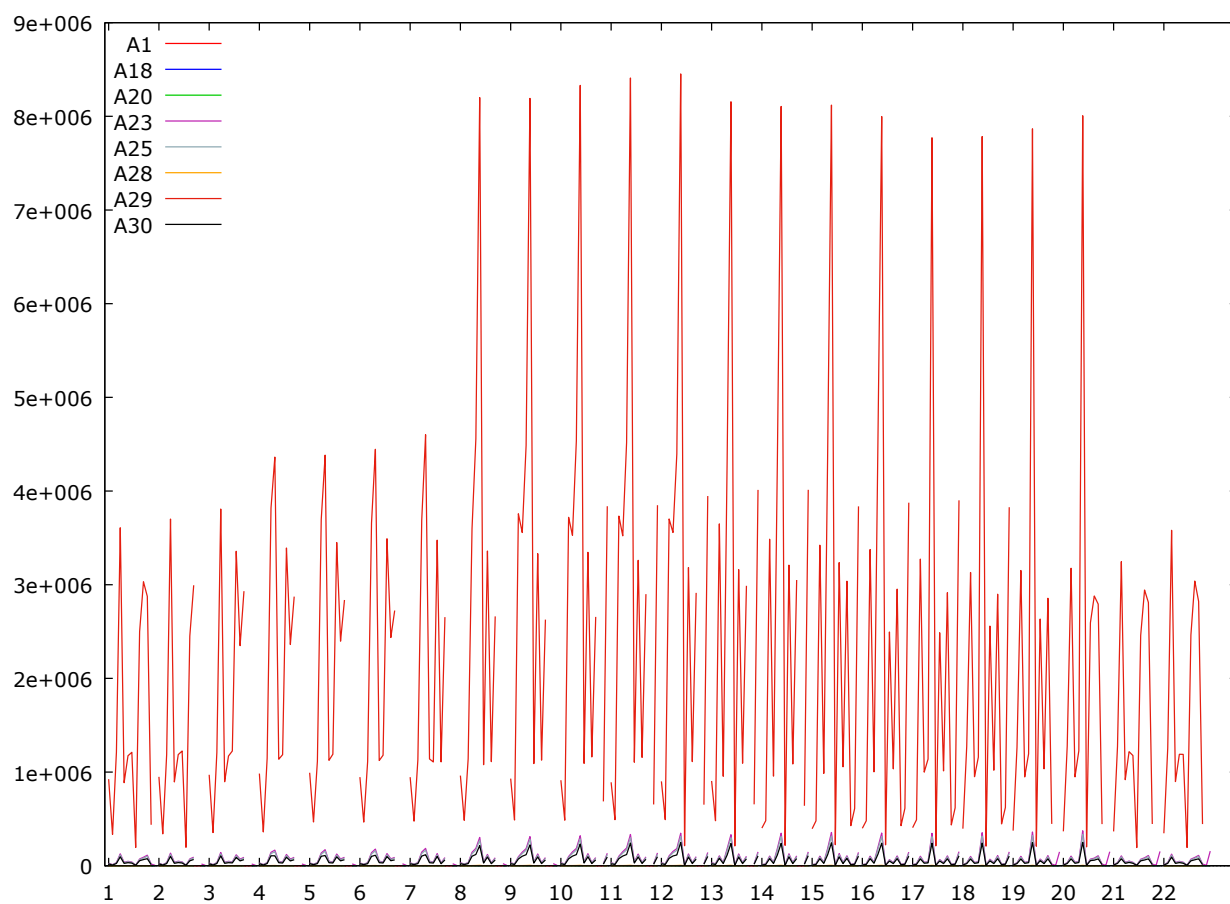


Figure 10. Group time series

Legend Variables. The sequent variables are from Eurostat database.	
Severe material deprivation rate by NUTS regions [ilc_mddd21]	A18
People at risk of poverty or social exclusion by NUTS regions [ilc_peps11]	A20
Gross domestic product (GDP) at current market prices by NUTS 2 regions [nama_10r_2gdp]	A23
Gross value added at basic prices	A25
Employment (thousand persons)	A28
Employment (thousand hours worked)	A29
Income of households	A30

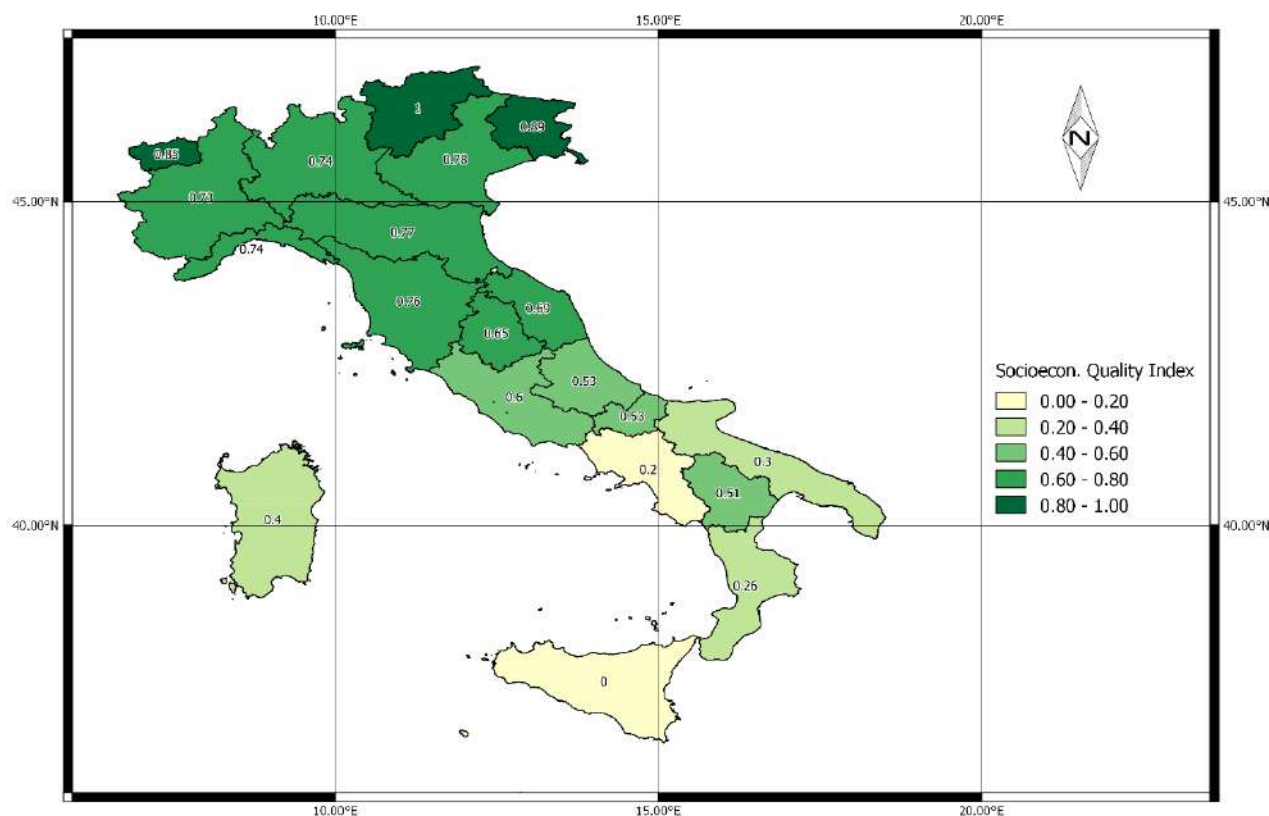


Figura 11. Socioeconomic Quality Index of Italy. Normalized values are shown.

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