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RIVISTA ITALIANA DI ECONOMIA DEMOGRAFIA E STATISTICA

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INDICE

WAR ON PENSIONS IS OVER. IF YOU WANT IT

Gustavo De Santis

1. Introduction

I will first recall the basics of AIPSs, Almost Ideal Pension Systems, a new, and in my opinion improved way to look at the pension issue. Once their guiding principles are grasped (section 2), all that refers to pensions finds its proper place, to the point that, in my opinion, disagreement on how viable PAYG (pay-as-you-go) public pension systems should be organized becomes (or at least should become) confined to the choice of just a few key parameters (section 3). In section 4, I show that the NDC (notional defined contribution) system that Italy introduced in 1996, later followed by a handful of countries, is a variant of AIPSs, probably not the best. AIPSs adopt an original point of view on several issues, and ageing is among these: what causes it, how it should be measured, and what impact it has on pension systems is briefly discussed in section 5.

For reasons of space and simplicity, in my presentation I will skip several important details: among these, the difficulties in transitioning from a pension system to another. When comparing different systems, I will simply assume that each of them has always existed. In all that follows, I will also assume that only one PAYG pension system is in force, with the same rules for everybody.

2. AIPSs - Almost Ideal Pension Systems

AIPSs (Almost Ideal Pension Systems - please note the plural) can also be applied in practice. Here, however, I will insist especially on their compelling theoretical properties, which derive from the fact that their constraints and the basic objectives they pursue are stated clearly from the beginning, and shape all the rest. The most basic constraint (which could be made more flexible in a more refined version of the approach, not presented here) is that contributions (=revenues, if we adopt the point of view of the pension system) must *always* match expenses, i.e.

pension (and, if they are included, child) benefits. This constraint, among other things, determines the (varying) level of the equilibrium contribution rate, as specified in eq. (2) below.

The next step is the choice of the socially preferred values for *five* policy variables,[1] all ranging between 0 and 1. Note that precisely because these choices are left to the preferences of each country, AIPSs are extremely flexible and adaptable to local traditions and values. For instance, they could be introduced as a general standard for the European Union (whose motto is "United in diversity"), while leaving each member State free to "customize" this standard to its own needs. Another advantage is that policy choices are clear, which is rarely the case in this domain, especially in practical applications. The disadvantage is that this freedom makes it harder for an observer to understand how AIPSs work, and why they can always fulfill their promises, in all possible circumstances and scenarios.

Two of these policy choices are demographic in nature: the (*relative*) shares of life to be lived as young Y^* and old, or senior, S^* in one's life. The remaining three are, let us say, socio-economic. Two of them measure the *relative* generosity towards those who are not in their adult years: y, a sort of *relative* child benefit (normally assumed to be zero in the pension debate) and s, the average relative pension benefit.[2] Finally, Q defines the socially preferred balance between actuarial equity (which is perfect when Q=1) and redistribution towards the poor (which is complete when Q=0). All intermediate choices are possible, and probably preferable, as we will see shortly.

All the rest derives mechanically from the budget constraint (revenues=expenses), from these five policy choices and from a few exogenous variables, as shown below. First, the share of life to be lived in adulthood is, obviously

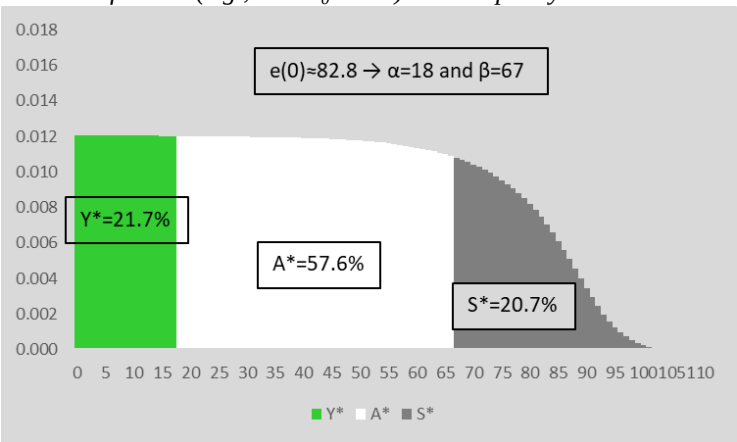
$$A^* = 1 - Y^* - S^* \tag{1}$$

Next come the threshold ages α and β that separate the young from the adult population, and this from the old, respectively. Note that these ages are *not* chosen (or varied) at will: they are the consequence of two policy choices (Y^* and S^*) and of an exogenous element: the current life table to which these choices must be applied. The threshold ages α and β must be such that the three *relative* areas

[1] Actually, after these choices are made, these variables become parameters (and these parameters should ideally remain constant for several years, if not forever). This point is briefly discussed further in the text.
[2] In theory, to be sure, y or s could be greater than 1. In practice, however, this is extremely unlikely.

below the survival curve that is associated with the current life table (and that reproduces its Lx series), are precisely the predefined shares *Y**, *A** and *S**, as in Figure 1.

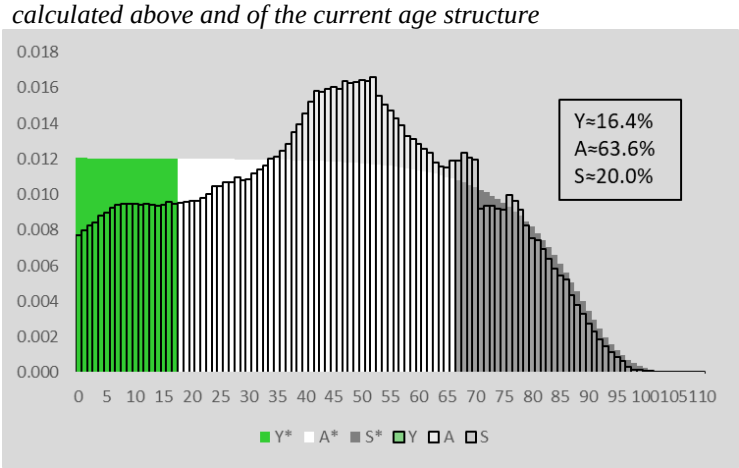
Figure 1 – *The threshold ages α (=18) and β (=67) are determined empirically, given the current life table (e.g., with e_0=82.8) and the policy choices Y* and S**



Note. The life table is that of Italy in 2016 (males and females; Source: Istat). Y=21.7% and S*=20.7% are exemplificative values*

The third step consists in applying these two threshold ages, α and β, to the current population age structure, to obtain the *actual* shares of young (*Y*), adult population (*A*) and old (or senior *S*), as in Figure 2.

Figure 2 – *The consequences in terms of Y, A, and S, of the threshold ages α and β calculated above and of the current age structure*



Note. The age structure is that of Italy as of 31.12.2016. As for the rest, see Figure 1.

The fourth step is the calculation of the contribution rate *c*. The budget constraint, the (costant) policy variables *y* and *s* (relative generosity towards young and seniors) and the (varying) shares of young, adults and seniors (*A*, *Y*, *S*) in the population lead[3] to

$$c = \frac{Ss+Yy}{A+Ss+Yy} \tag{2}$$

Two more exogenous economic variables must be used at this point: the employment rate *e* (ratio between the employed, *of all ages*, and the adult population) and the average gross wage of the employed G_e. Their product gives the average gross wage of the adult population[4] G_a, or simply *G*

$$G_a = G = e \cdot G_e \tag{3}$$

As the contribution rate is known from eq. (2), the average *net*[5] wage of the adult population W_a, or simply *W*, the economic numeraire of the system, is

$$W_a = W = G_a(1 - c) \tag{4}$$

Given *s* and *y* (policy choices), the average pension *P* and child benefit *B* are

$$P = s \cdot W_a \quad \text{and} \quad B = y \cdot W_a \tag{5}$$

Finally, knowing the cumulative contributions paid by each senior K_i (their "virtual capital") and the average *K* of these virtual capitals, the individual pension benefit of each senior P_i is obtained as

[3] Passages not reported here. Please note that, apart from for the policy choices, ideally constant over time, both the exogenous variables (e.g., the life table), and the dependent variables are time varying, and should therefore be written with a deponent (e.g., Y_t, A_t, and S_t), which I am omitting here, to simplify the notation. While *c* (or, more precisely, c_t) $c^* = \frac{S^*s+Y^*y}{A^*+S^*s+Y^*y}$, calculated on the basis of policy choices, does not, and *c** can be proved to be (very close to) the long term average of c_t.

[4] This notion is new, to the best of my knowledge: I could not find any antecedent in the literature. Note that the definition is somewhat loose: G_a *refers* to the adult population (in the denominator), but some of those who are employed and earn money with their work (i.e., the numerator) may be, and probably are, young or old.

[5] Net of the contribution rate. Later on, all incomes (labour earnings, pension and child benefits) will have to pay the personal income tax, not considered here. Just like G_a, W_a is, I believe, a new concept in this field of study, and *refers* to the adult population (in the denominator), even if some of those who are gainfully employed (in the numerator) may be young or old.

$$P_i = P(1-Q)\cdot P\frac{K_i}{K}Q \tag{6}$$

where Q is the policy choice that strikes the locally preferred balance between actuarial equity and redistribution towards the poor. Q=0 leads to P_i=P (every senior receives exactly the same, average pension benefit, regardless of their past contributions to the system); at the opposite extreme, Q=1 leads to P_i=$P(K_i/K)$, where individual pension benefits depend solely on the relative value of past contributions. Intermediate solutions (0<Q<1) are obviously possible, and probably preferable.

2.1. Rationale and some details of AIPS

The reason why AIPSs work is that everything is defined in relative terms, and all the relevant constraints are automatically considered in the system. The most important among them is budget balance, which is always granted, because, by definition, the system outlays, pension (*SP*) and child benefits (*YB*), match revenues (=contributions=*AcG*).

The economic numeraire of the system is $W=e\cdot G_e(1-c)$, which is *net* and refers to the *adult* population, not only to the employed. Therefore, it incorporates the three essential pieces of information in this domain: the employment rate *e*, the average labour earning *G* and the contribution rate *c*. The current economic conjuncture (combination of employment *e* and labour earnings G_e) is always correctly and timely measured by the product $e\cdot G_e$, and this economic indicator is further adjusted to the weight of the transfers that the system imposes (*c*), which in turn depend on how many and how generously treated the economically dependent are. All this is incorporated in $W=e\cdot G_e(1-c)$, and translates immediately into higher or lower economic wellbeing not only of the adults themselves (*W*) but also, through the constant (relative) parameters *s* and *y*, of seniors (*P*=*sW*) and youngsters (*B*=*yW*).[6] In other words, with AIPS, no economic scenario can alter the *relative* economic well-being of the three demographic groups that matter for a pension system: the old and the young (the potential beneficiaries of transfers) and the adult population (the bulk of those who pay these transfers). In times of prosperity, everybody rejoices; in times of crises, everybody suffers - and always in the same proportion, a principle known as *risk sharing* in economic literature

[6] Child benefits can be zero: in this case *y*=0, *B*=0, and *c* (eq. 2) simplifies to *c*=*Ss*/(*A*+*Ss*). Most observers will consider this as the only logical possibility in a pension system. I disagree, but I cannot discuss this point here, for reasons of space. Interested readers are referred to De Santis (2014).

(except that, to the best of my knowledge, nobody had been capable of implementing it in full in a pension system).[7]

Once the average pension benefit P is known, individual pension benefits P_i can be determined (through eq. 6) in such a way that two essential conditions are met: a) their average is precisely the P value that balances the system, and b) the preferred equilibrium between actuarial equity and redistribution is maintained, mirroring societal preferences, as explicitly expressed via the parameter Q ($0 \leq Q \leq 1$).

3. What the debate about pensions should be confined to

With AIPS it becomes immediately apparent that, apart from a few details that I cannot discuss here for reasons of space (e.g., survivors' pensions), the whole debate about the pension issues reduces to the discussion of the best possible combination of the five policy parameters introduced above (Y^*, S^*, y, s, Q).

Note that several variables that are usually introduced in discussion about this topic simply disappear. Inflation, for instance, is neutral to the system, and so are employment and labour productivity. Retirement age (β) is not directly a policy variable, and should not be treated as such. Rather, it is a consequence of a policy choice (S^*) and of (exogenous) survival conditions, as measured by the current life table (see again Figure 1). Incidentally, AIPSs implicitly solve the problem of what to do in the presence of population ageing, as we will discuss shortly (section 5).

Even with this drastic reduction of dimensionality (only five, well-defined variables come into play with AIPSs), the room for social preferences is huge. Indeed, depending on the policy choices, AIPSs can result in public PAYG pension systems that virtually disappear (if s tends to zero) or become intolerably burdensome (if s is very high). Retirement age can be high or low (depending on S^* and on the current life table); redistribution towards the "poor" (meaning: those with scarce contributions to the pension system) can be high (if Q tends to 0) or nihil (if Q tends to 1), etc.

Besides, if proper legislative measures are taken to ensure that these policy variables do no change "too often", the system is almost free of the so-called policy risk, i.e., the risk that policy makers change the rules to favour their lobbies (or simply those who vote now) at the expenses of others, typically future generations,

[7] "Vertical equity", i.e., keeping a sensible a relatively stable proportion between the average economic well being of the various age classes in each given year, is normally not granted *a priori* in pension systems: rather, it is a consequence of other choices, and the outcome can be highly disappointing (e.g., far from the socially preferred level, or varying over time).

who are not there to express their preferences. Indeed, one of the great advantages of AIPSs is that they never *need* to be changed, because, for instance, they will never incur deficits and they will always keep their (relative) promises. On the other hand, they *can* be changed, if collective preferences (as expressed by the five policy variables mentioned above) do not remain constant over time.

Besides, the parameters of AIPSs can be used to correct for the most frequent (and grave) distortions of all pensions systems, which typically benefit the "rich", because they are usually those who outlive the rest of the population and receive pension transfers for more years. However, as shown in De Santis (2014), this bias can be substantially attenuated - if not altogether eliminated - by an appropriate parametric choice. The first candidate is obviously *Q*: keeping it below 1, and therefore introducing some redistribution towards the poor, may compensate the poor for the (economic) loss they suffer from living shorter lives than the rich. Compensation may be partial or full (or even turn into overcompensation), depending on differential survival and on the preferred value of Q. Redistribution is also possible via *y* (child benefits). These are the same for everybody, but are financed by contributions (that is: those who earn more pay more): therefore, they operate a redistribution towards the poor. The extent of this redistribution is linearly dependent on the value of y, and obviously disappears if *y* goes to zero (no child benefit included in the transfer system).

4. A quick comparison between AIPS and NDC (Dini/Fornero) in Italy

AIPSs are not antithetic to the pensions system we now have in Italy, which is of the Notional Defined Contribution (NDC) type, but which is usually referred to as Dini/Fornero, by the names of the Ministers who first introduced it, back in 1996 (Dini), and then accelerated its implementation in 2011 (Fornero). Both systems pursue exactly the same objectives: budget balance, close correspondence between contributions paid to the system in one's active life and pension benefits in retirement; adjustment of the average length of the working life to the average length of life *tout court*, etc. But AIPSs do it better. A prominent example is the balance between actuarial equity and redistribution, which is an explicit policy choice in AIPSs, and is, instead, a hidden and unpredictable outcome in NDC, stronger when inflation is high, because the pension benefits of the "rich" are adjusted less than proportionally to the increase of prices. Another example is the fact that, as economic and survival conditions change, NDC adjusts the pension benefits only of the new pensioners, whereas AIPSs adjust that of *all* pensioners, old and new alike. A third, and maybe even more relevant difference is that with NDC nothing guarantees that pension "rights" match contributions (and in fact they

do not: the system is underfinanced, and needs public transfers to survive), whereas with AIPSs budget balance is always granted, by definition.[8] Fourth and, in my eyes, essential aspect: with AIPSs, the standard of living of the old (their pension benefit) is forced to stay in line with that of the adult population, at the socially preferred (relative) value *s*: if the economic scenario changes, for instance deteriorates because of population ageing, the standard of living declines uniformly for the entire population (see below). With NDC, instead, this type of equilibrium is not under control, and virtually anything can (and does) happen to the relative standards of living of young, adults and old.

5. Ageing and pensions, with and without AIPS

All pension systems suffer from population ageing. If ageing is sufficiently strong and prolonged, all "standard" pension systems incur deficits, which may become large, and force governments to change the pension rules, especially if the system was poorly conceived from the start. This is indeed what has always happened, everywhere in the developed world, where pension systems exist, and populations are ageing, more or less rapidly (OECD 2017).

With AIPSs, however, it is opportune to distinguish between two causes of population ageing. One is low fertility or, less importantly, emigration of young people, or a combination of the two (for instance, very low fertility, whose ageing effects are so strong that they cannot be counterbalanced by immigration - as it happens in Italy). In this case, *ceteris paribus* (i.e., with constant mortality) AIPSs need no adjustment: given the policy choices on Y^* and S^* (share of life to be passed as a young or a senior), α and β will remain the same. The share of seniors in the actual population (S) will increase (more than the share of the adult population A) and this will likely[9] produce an *automatic* increase in the contribution rate c (eq. 2). With higher c, the net labour earning of the adult population W [$=G(1-c)$] will decline, and so will pension P ($=sW$) and child benefits B ($=yW$), which are proportional to W. In short, everybody will be worse off, in the same proportion, but the pension system itself will not be affected.

The second cause of population ageing is better survival, and longer life spans. This means that there will be a new, more favourable life table to use as a standard of reference, in place of the old one (e.g., that of Figure 1). If, for the sake of

[8] Incidentally, this implies that AIPSs do not need projections of any kind: demographic, economic, etc. Of course, projections can and should be made, to evaluate the likely consequences of the various possible choices (i.e., to choose the "best" version of AIPSs), but the viability of the system is always granted.

[9] This depends also on y and s, that is on the relative generosity of the transfer system towards the aged S and the young Y. In all likelihood, however, the result will be an increase in c, the contribution rate.

simplicity, we assume that policy choices do not change, and therefore that the shares Y^* and S^* remain the same, what will automatically change are the threshold ages α and β. In the long run, this will result in an unchanged *average* share of young, adult and elderly population in the actual population (i.e., these shares change over time, but their averages, which are Y^*, A^* and S^*, respectively,[10] do not), and therefore also in a constant *average* contribution rate c (which changes over time, but whose average is constant, c^*).

This is another way of saying that longer survival may or may not cause population ageing, depending on how one measures it. All measures "starting from 0", where what counts is the number of years already lived, will reveal that longer survival causes population ageing: be it average age, or share of population above a given age (e.g., 65 years), or any other index of this type. Conversely, all the measures starting from the bottom will instead reveal that the population is rejuvenating: e.g. proportion of people with less than N years left to live, on average (e.g., with a residual life expectancy of 15 years or less). Finally, a measure like the one that AIPSs use (constant share on one's life lived in the three stages of young, adult and old age, with adapting threshold ages α and β) will prove neutral: longer age spans tend have no effect on ageing in the long run, although they do cause some effect in the short[11] run, during the adjustment phase.

A priori, there is no reason to prefer a specific criterion for the measurement of ageing. I submit, however, that, once the social preferences on the shares Y^*, A^* and S^* have been expressed, there is no reason why changes in survival should affect them. For the sake of simplicity, let us imagine a rectangular population age structure where everybody dies at age 80, and let us assume that the social preferences are such that 25% of one's life should be lived as young (no need to work: somebody will feed you), another 25% as old (no need to work: the pension system will provide), and the remaining 50% as a working adult. In practice, people will work between their 20th and their 60th birthday. Now imagine that, thank to medical innovation, the length of life jumps to 84 years, again with no individual variability. Of course, one could keep the retirement age constant at 60, but this would increase the share of one's life spent in retirement to (24/84≈) 28.6%. Conversely, one could raise retirement age by much as life expectancy at birth (or at any other age, for that matter - the solution that Italy decided to adopt), which would bring it to 64. But in this case, the proportion of one's life spent in retirement would decrease to (20/84≈) 23.8%.

All in all, it seems (to me) preferable to make the retirement age increase *automatically* in such a way that the proportion of one's life spent in retirement

[10] This happens because the actual population age structure tends towards the age structure of the current stationary population (see De Santis and Salinari, 2018): as the latter changes, the former follows.

[11] "Short" may mean several years. But a properly designed pension system should live forever...

remains constant at the socially preferred level of (21/84=) 25%. To obtain this, β must increase from 60 to 63 years. Changes in social preferences with respect to the ideal shares *S** and *Y** are always possible, of course, but the point is that they should be explicitly and collectively decided, and not left to external forces, such as the evolution of survival.

The (automatic) upward adjustment of β and α, in line with e_0, implies that the "quality" of life improves consistently with its "quantity", that is that one can work and be productive up to older ages: health conditions are good enough, brain capacities remain relatively high, etc. Although these aspects are difficult to measure (especially in a way that can be considered fully comparable in space and time), remain controversial and are in all cases subject to great variability, this is what seems to be happening (see, e.g., Levine and Crimmins 2018). Besides, this is consistent with the so-called Flynn effect, i.e. the increase in IQ intelligence test scores observed in several countries over the 20th century (Trahan et al 2014) and with the marked increase in education of the more recent cohorts.

6. Conclusions

AIPSs are much more flexible than this short presentation allows me to show. For instance, the progressive increase of the threshold ages α and β that would permit a society to keep the reference shares of life (Y*, A*, and S*) constant as life expectancy increases is not strictly necessary. But failing to adjust them has a cost (as any other choice in a properly designed transfer system): the progressive increase in *c**, i.e. the average over time of the contribution rate *c* (cf. footnote 3). Also, those who favour a greater share of private companies in the pension system should not oppose AIPSs on this ground: AIPSs can be very pervasive or virtually non-existent, depending on the values decided for the policy parameters *S** and *s*. In short, while the preferred version of AIPSs can be questioned, AIPSs in themselves should not - or at least this is my impression.

To be sure, AIPSs also have some "peculiarities" which may appear shortcomings (but which, in my view, are not). For instance, age at retirement varies over time, so that people who are currently employed ignore when they will be able to retire. Similarly, also individual pension benefits, and their average, do not remain constant,which introduces a certain degree of uncertainty as to one's future standard of living. My counterargument is that the future is unknown, by definition, and that guaranteeing certain benefits to some population subgroups (e.g., the retirees) means simply to transfer the entire burden of uncertainty to other

population subgroups (the adult population, in this case). I strongly doubt that this solution would be ethically preferable to what AIPSs do, i.e., redistributing the risks of the uncertain future on *all* population subgroups, and in the same way. In all cases, I observe that this is not what happens in practice: when the system goes out of balance, all societies intervene *ad hoc*, in various ways, to try to "bring it back in line" it: adjusting or not adjusting benefits for inflation, moving the retirement age, introducing maxima and minima, ad hoc taxation, etc. AIPSs simply have an embedded mechanism by which all the necessary adjustments take place automatically and preserve the basic societal preferences, as explicitly (and parametrically) expressed through the policy choices.

While the superiority of AIPSs over all possible alternatives appears to me to be out of question, several issues remain open. For instance: how to form a majority that would agree to transform the existing PAYG arrangement into an AIPS, how rapid this transformation should be, what is the best ("optimal") combination of the policy parameters (Y^*, S^*, y, s, and Q) that would maximize the welfare of each society, and how to ensure that these policy choices remain stable (ideally constant) over time, without depriving a society of the right to change them, if preferences change. These are big, but possibly premature questions: the first step - recognizing the superiority of AIPSs over all other pension systems - has not been taken yet.

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SUMMARY

War on Pensions is Over. If You Want it

In this paper I present AIPSs, Almost Ideal Pension Systems, which are a new way to design pension systems. AIPSs pre-define their constraints (budget balance) and their policy targets (in the form of five policy parameters), take into account all the relevant demographic and economic (time-varying) variables (current survival, current age structure, current employment rate and labour productivity, etc.) and consistently derive the (time varying) dependent variables of the system (age at retirement, individual and average pension benefits, etc.). While logically stringent and mathematically very simple, AIPSs may nonetheless be difficult to understand, for two main reasons. In part, because they use non-standard notions (e.g. the net labour income of the adult population) and in part because the combination of the policy choices (through the five parameters mentioned above) may result in widely different outputs, apparently with little or nothing in common - and yet all belonging to the same AIPSs family.

While accepting AIPSs as the standard of reference in this field off study is, in my view, a necessary first step, several other issues remain open: among them, how to identify the best possible set of the policy choices and how to transition from the current PAYG pension arrangement - whatever it is - to the preferred form of AIPS.

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AGING AND PENSIONS IN ITALY: HIGHLIGHTING REGIONAL DISPARITIES

Thaís García-Pereiro

1. Introduction

Aging is a is a key long-term demographic challenge that it is expected to threaten the viability of pension and health systems over the next future in Europe. Population aging in Italy is well underway. In 2017 the proportion of individuals over 65 years old was around 22.3% and according to the Aging Index (AI) there were 165 over 65 per 100 individuals between 0 and 14 years old. The Italian National Institute of Statistics (ISTAT) estimates that population aged 65 and over is expected to increase to 33% by 2050, while the AI will reach the value of 262.

Without proper responses, population aging is likely to affect the welfare state by menacing sustainable development and inclusive growth since it obstacles the state's capacity to meet the needs of elders without compromising the capability of future generations to meet their own.

It is not possible to know exactly which the future consequences of population aging will be, as a unique situation, no historical examples are available to lead policy and planning. However, without clear interventions, aging might have some important implications on modern societies affecting age-related government budgets, living standards, future growth and sustainability of public welfare systems.

The share of working-age beneficiaries will shrink reducing expenditure dedicated to unemployment benefits or social assistance. Moreover, the growing number of elders will exert a strong pression not only on future public finances rising expenditures on pensions, health and long-term care but also on incomes, provision of other public social services (Bloom *et al.*, 2015) and intergenerational solidarity. Responses to aging will require several reforms to both public policy and business practices (Bloom *et al.*, 2010).

Italy is becoming one of the oldest countries in the world while its economically active population is shrinking. Despite recent reforms acted, such an unstoppable trend is likely to place significant pressure on economic growth and public expenditures challenging public policy. This paper aims at answering the following

research questions: which indicators more accurately measure the aging burden? does the Old-Age Dependency Ratio (ODR) illustrate the implications of population aging? are there important territorial differences (NUTS1 & NUTS2 levels) in terms of aging and public pension expenditures? is it possible to identify changes following pension reforms that have recently been acted in Italy? Does the implementation of mixed policies improve results? which will be the future scenario?

Data are drawn from demographic, labour force, and pension system statistics available at the regional level (NUTS2) from the Italian National Institute of Statistics (ISTAT). The analyses reply Bongaarts' calculations (2004) to estimate the pensioner ratio (PR), the pensioner per worker ratio (PWR), the benefit ratio (BR) and, finally, the public pension expenditure ratio (PER).

The structure of the paper is as follows. Section 2 presents a brief description of the evolution and future scenarios of population aging in Italy. Section 3 is dedicated to the analysis of pension expenditure and simulates its evolution under a mixed policies scenario. The last section is dedicated to conclusions and some policy recommendations.

2. Aging in Italy: evolution and projections

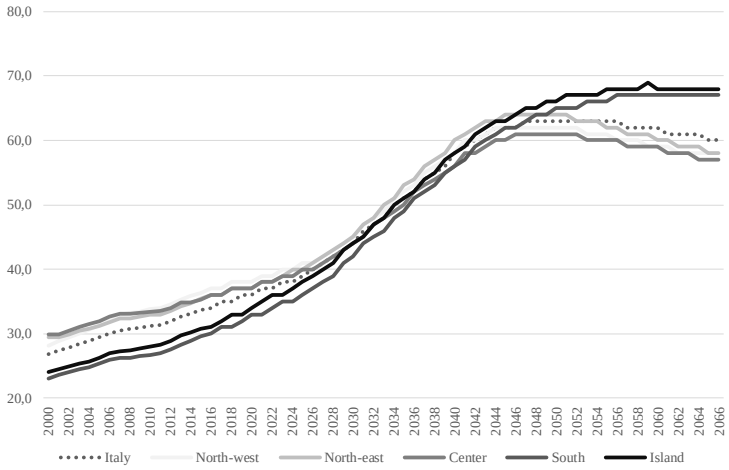
In Italy population aging is expected to significantly grow during the next decades because baby boomers are growing older. As shown in Figure 1 the ODR has increased more than thirteen points between 1990 and 2017 and it will continue growing doubling its value in 2066. In the last part of the figure the curves diverge indicating: first, that the youngest macro-areas will become the oldest (South and Island) and, second, in Southern Italy the ODR will still grow while will start decreasing in the North and Center around 2050.

The trend followed by the aging process hides important territorial differences that emerge only when disaggregating the ODR at the regional level (Figure 2). Almost half of regions are above the ODR of the country in 2016, being Liguria (47), Friuli-Venezia-Giulia (41), Piemonte (40), Toscana (40) and Umbria (40) the oldest five. After fifty years, estimations show Sardegna (77), Basilicata (76), Molise (72) and Puglia (70) as the oldest regions. The fastest growth will be recorded in Basilicata where the ODR will be more than 2.4 times higher in 2066 than in 2016. Instead, the Liguria's pace of increase will be the slowest.

Even if the ODR illustrates the relative weight of population above 65 years old over those aged between 15-64, it does not accurately measure the real aging burden that societies might carry. This is so because the number of individuals

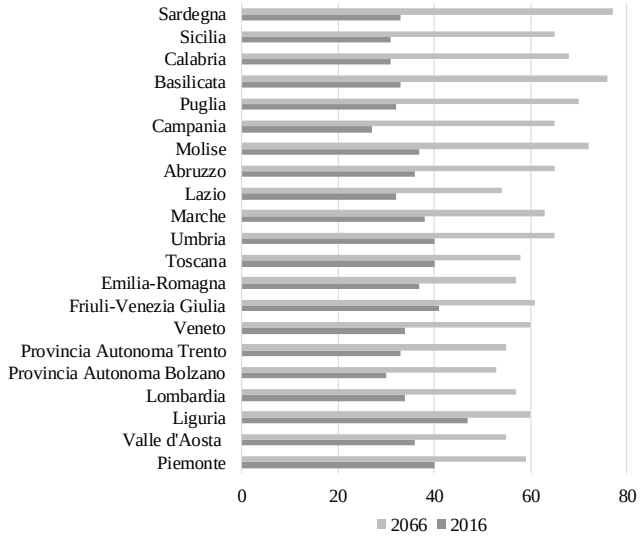
aged 65 and over are always lower than the number of pensioners and population aged 15 to 64 is higher than the real number of workers.

Figure 1 – *Italy. Evolution of the Old Age Dependency Ratio (ODR) and projections (central scenario). Years 2000-2066.*



Source: Own elaboration, ISTAT data.

Figure 2 – *Italy. Old Age Dependency Ratio (ODR) by regions (NUTS 2). Years 2016 & 2066.*



Source: Own elaboration, ISTAT data.

Considering such limits, Bongaarts (2004) suggests the ratio of pensioners to workers (PWR) as a more sensible and accurate indicator of the aging burden.

$$PWR = ODR * PR/ER \quad (1)$$

Where the Pensioner Ratio (PR) in (1) is computed as the ratio between the number of pensioners and the number of individuals aged 65 and over.

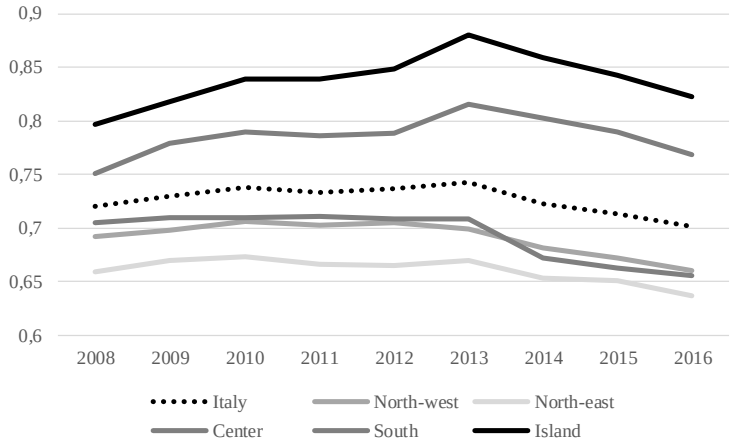
If the ODR and the PWR are confronted (this last at Figure 3), it is evident the rise of two completely different trends. The ODR shows a continuous growing trend between 2008 and 2016 (Figure 1) and two diverse profiles: the youngest Southern and the oldest North and Center. The evolution of the PWR also displays two different Italy's, with the Island and the South as the areas with the highest pensioner-worker ratio. The figure also reveals a clear cut-off from 2013 on when the PWR starts decreasing. This observed reduction could be reflecting the *Fornero effect*, the most recent reform acted by the Italian government.

Since 1992, policymakers have been responding to budget sustainability caused by population aging in a context of increasing economic uncertainty and austerity packages. The Italian pension system started then a long transformation process from a single-pillar towards a multi-pillar structure. The last reformed acted in 2011 has increased the pensionable age, has modified eligibility conditions for old age pensions, early retirement pensions and old age social allowance -which are automatically linked to increases in life expectancy at 65 years- and has accelerated the transition to the Notional Defined Contribution (NDC) system (EC 2015, OECD 2018).

A lower ODR should not be automatically translated into a lower aging burden, a higher share of anticipated pensions or lower employment rates are more important determinants of the burden than the actual number of elders.

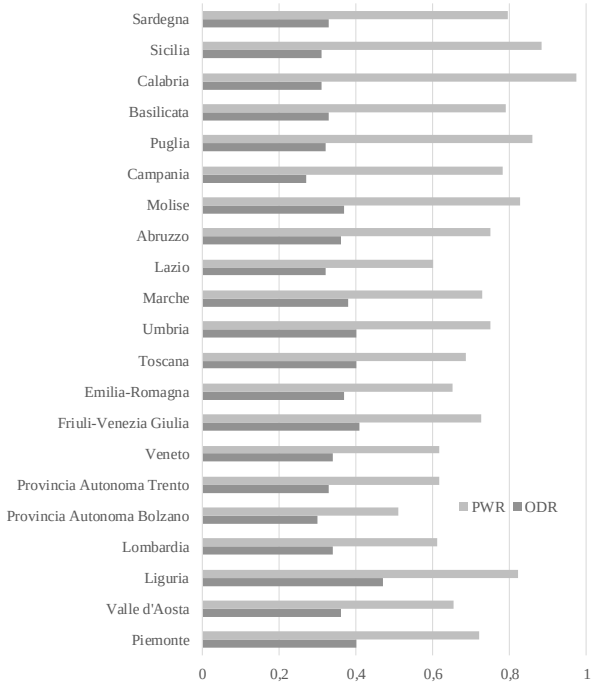
The figure bellow compares the ODR and the PWR at regional level in 2016 (Figure 4). From the data in this figure it is apparent that values differ widely, from a low 0.60-0.61 in Lazio and Lombardia to a high 0.98 in Calabria or 0.85 in Puglia. This ratio is much larger than the ODR in all regions but is more than 3 times higher in Calabria and 2.9 in Campania and Sicilia. The ratio between pensioner and workers displays the lowest values in Lazio (0.60), Lombardia (0.61) and Veneto (0.62).

Figure 3 – *Italy. Evolution of the Pensioner per Worker Ratio (PWR) by macro-area (NUTS 1). Years 2008-2016.*



Source: Own elaboration, ISTAT data.

Figure 4 – *Italy. Old Age Dependency Ratio (ODR) and Pensioner per Worker Ratio (PWR) by regions (NUTS 2). Year 2016.*



Source: Own elaboration, ISTAT data.

3. Public expenditure on pensions: possible solutions from mixed policies

One of the most important consequences of population aging has been the fast and huge increase of the cost related to the pension system. This paper replies Bongaarts' (2004) calculations to measure the increased experimented in Italian regions through the Public pension Expenditure Ratio (PER):

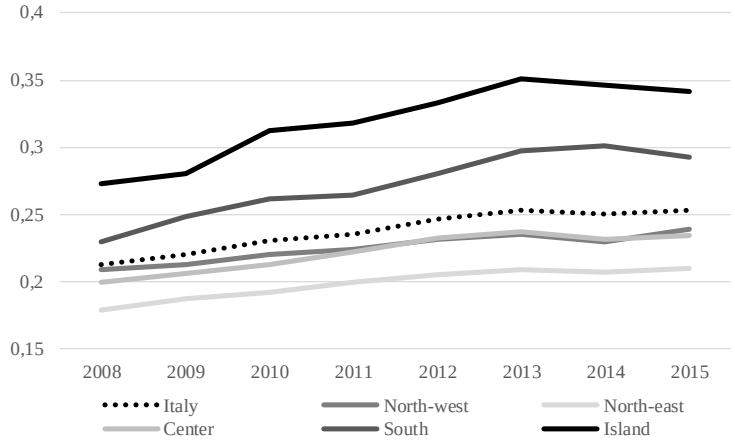
$$PER = BR \, x \, PWR \tag{2}$$

Where the Benefit Ratio (BR) in (2) is computed as the ratio between the average public pension (per pensioner) and the average income (per capita).

Figure 5 displays the evolution of the public pension expenditure ratio (PER) in Italy (NUTS1). In 2013, pension expenditures amount to 21 percent of income in the North-East, but they almost reach about one quarter in the North-West and in the Center, and they slightly exceed one third of income in the South (30%) and Island (35%). Moreover, average public pension benefits are most generous in the South and Island, where they equal 36% and 40% of average income, respectively. Benefits are lower in the North East at slightly more than one third of average income.

When looking at regions, Sicilia (0.38) and Calabria (0.37) reached the highest PER in 2013, and three years later have settled on 37% and 36% of income, respectively. Sicilia has the highest BR and the second highest PWR.

Figure 5 – *Italy. Public pension Expenditure Ratio (PER) by macro-area (NUTS 1). Years 2008-2016.*



Source: Own elaboration, ISTAT.

Table 1 presents the summary of the indicators calculated following Bongaarts' (2004) method for 2015 at both NUTS1 and NUTS2 levels. The position of Liguria (16^{th}) is mostly due to the effect of the age structure: it has the highest ODR and a high Pensioner per Worker Ratio. Instead, in both Sicilia and Calabria the values of the ODR are among the lowest but this favorable effect of the age structure is reversed by the combination of the highest benefit ratio and a low employment rate in the first case, and the lowest employment rate and the highest PWR in the second.

The most interesting observation that emerges from the data comparison comes from Emilia-Romagna (fifth position of the PER ranking), where a relatively old population (if compared to the ODR of regions with lower PERs) is contrasted by the second highest employment rate (67%). This region is a perfect example of how to challenge aging with a high share of employed people.

A closer inspection of the evolution of PER (Figure 5) clearly shows a sort of stabilization of public expenditure dedicated to pensions. Here again, this trend might be attributed to the "*Fornero effect*" that has reduced the number of pensioners expected by expanding working careers.

Policymakers and stakeholders in Italy have responded to the economic consequences of aging by implementing policies to reduce pensions costs (i.e. expand working careers, update public pension schemes, encourage private personal savings). However, there are other policy options that might help reaching better results (such as labour market policies). For example, to increase labour force participation by enhancing the processes of activation or reintegration of low employment groups (mothers with young children, older workers, people with disabilities, undocumented migrants). When simulating a situation in which pensions policies acted had been accompanied by a slight rise in employment, where the Employment Rate (ER) increased by 0.05% /year from 2008 to 2015, the Public pension Expenditure Ratio (PER) would further decrease despite the shortness of the period. The greatest reductions would be registered in the Island and the South where PER would lose 3 and 2 points, respectively.

Figure 6 illustrates the future evolution[1] of PER by macro-areas and makes evident that the heaviest burden that will carry public budgets is still to come. Around 2042, the PER for Italy will be 2 times higher than it was in 2008 and will stabilize representing 45% of income afterwards. The North and the Center have shown and will still show the lowest levels of pension expenditures, reaching around 35% of income by 2066. The most striking result to derive from this projection is the significant growth of expenditure in southern Italy (72% in the Island and 63% in the South by 2066). If looking at the regional level, the PER

[1] PER projections were computed using ISTAT projections of the ODR (demographic indicators) and maintaining the rest of indicators fixed at 2016 values.

triplicates its value in Sardegna and Campania and exceeds the duplication in Molise, Puglia, Basilicata, Calabria and Sicilia during the period 2008-2066.

Table 1 – *Italy. Estimates of indicators based on Bongaarts. Year 2015.*

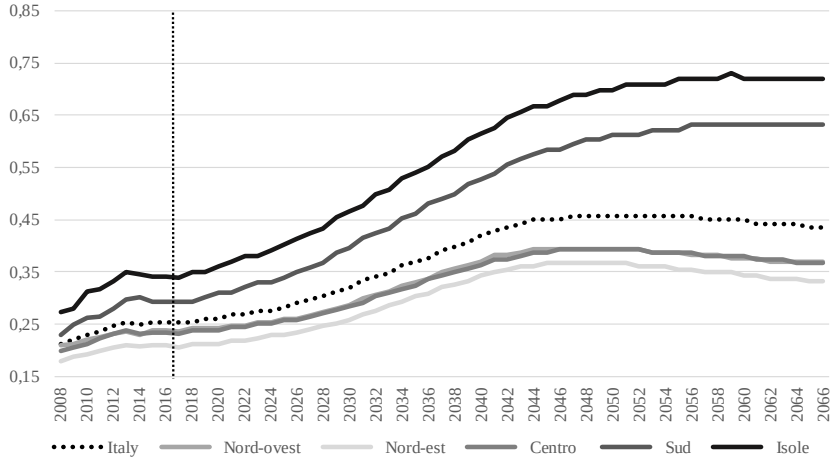
	PER	**BR**	**ODR**	**PR**	**ER**	**PWR**
North	**0.21**	**0.32**	**35.40**	**0.93**	**0.65**	**0.64**
Center	0.23	0.35	35.30	0.79	0.61	0.66
North-west	0.24	0.36	36.30	0.93	0.64	0.66
South	0.29	0.37	29.60	0.69	0.46	0.67
Island	**0.34**	**0.41**	**30.80**	**0.63**	**0.43**	**0.82**
Italy	*0.25*	*0.35*	*33.70*	*0.82*	*0.56*	*0.70*
Provincia Autonoma Bolzano	**0.15**	**0.29**	**29.20**	**1.03**	**0.71**	**0.51**
Veneto	0.20	0.32	33.60	0.91	0.64	0.62
Provincia Autonoma Trento	0.21	0.34	32.20	0.97	0.66	0.62
Lombardia	0.21	0.34	33.70	0.96	0.65	0.61
Emilia-Romagna	**0.22**	**0.32**	**37.20**	**0.96**	**0.67**	**0.65**
Toscana	0.22	0.32	39.70	0.85	0.65	0.69
Marche	0.22	0.31	37.60	0.87	0.62	0.63
Valle d'Aosta	0.24	0.37	35.30	0.90	0.66	0.65
Lazio	0.24	0.40	31.60	0.71	0.59	0.60
Umbria	0.25	0.33	39.40	0.83	0.63	0.65
Friuli-Venezia Giulia	0.26	0.35	40.30	0.89	0.64	0.63
Abruzzo	0.27	0.35	35.00	0.77	0.55	0.65
Piemonte	0.28	0.38	39.10	0.95	0.64	0.62
Basilicata	0.28	0.35	32.90	0.74	0.49	0.67
Sardegna	0.30	0.38	32.50	0.69	0.50	0.70

Liguria	0.31	0.37	46.30	0.80	0.62	0.82
Puglia	0.31	0.36	31.30	0.71	0.43	0.86
Campania	0.32	0.39	26.20	0.65	0.40	0.78
Molise	0.33	0.37	36.10	0.78	0.49	0.83
Calabria	**0.36**	**0.36**	**30.60**	**0.70**	**0.39**	**0.97**
Sicilia	**0.37**	**0.42**	**30.30**	**0.61**	**0.40**	**0.88**

Source: Own elaboration, ISTAT.

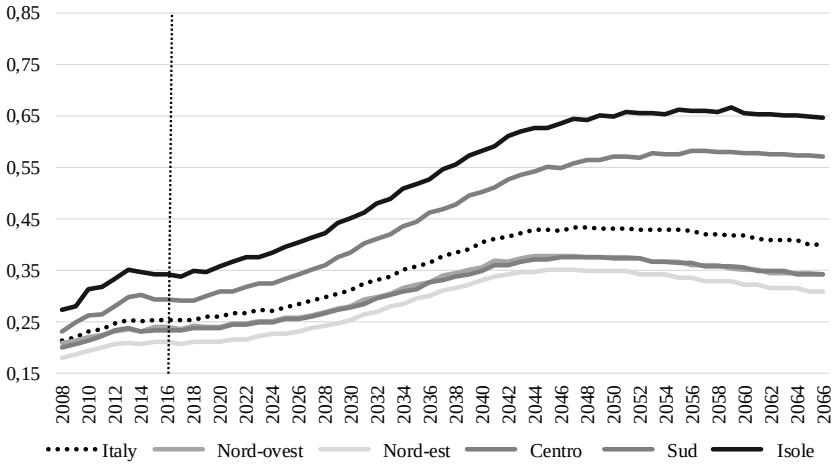
Which reduction on PER will produce an increase of employment? Figure 7 shows the simulated effect on the Public pension Expenditure Ratio (PER) between 2017 and 2066 of a 0.1% /year rise in employment rates. This action would certainly not stop the increasing trend of expenditure on pensions, but it would generate significant changes on the magnitude of this rise. It is possible to observe a reduction of PER of at least 5 percentual points in Italy (if compared to previous projections) and more than six points in the South (57%) and Island (65%).

Figure 6 – *Italy. Evolution and forecast of the Public pension Expenditure Ratio (PER) by macro-area (NUTS 1). Years 2008-2066.*



Source: Own elaboration, ISTAT.

Figure 7 – *Italy. Evolution and forecast of the Public pension Expenditure Ratio (PER) by macro-area (NUTS 1) with a yearly increase on Employment Rates. Years 2008-2066.*



Source: Own elaboration, ISTAT.

4. Conclusions, implications and policy recommendations

Results are in line with Bongaarts' statement (2004) about the lack of adequacy of standard indicators of population aging to measure the real burden of a growing number of elders on states budgets. When applied to Italy, the Pensioner per Worker Ratio (PWR) seems to better control territorial variations in employment and pensioners ratios.

In fact, differences between Old age Dependency Ratio (ODR) and PWR have important implications both at NUTS1 and NUTS2 levels. Southern Italy shows the lowest values of ODR, but has the highest PWR. This high value of PWR is then translated into an increased Pension Expenditure Ratio (PER), meaning a higher burden.

In this setting, it has been demonstrated the decisive role played by a high employment ratio to neutralize the cost of population aging. A great example is Emilia-Romagna a region that, even if having a high number of elders compared to working-age population, enters on the ranking of the top 5 regions with the lowest PER thanks to one of the highest employment rates of the country.

One of the most interesting findings is related to the effect of recent policies acted to reduce pensions costs. The evolution of both the Pensioner per Worker Ratio (PWR) and the Pension Expenditure Ratio (PER) clearly shows a turning

point after 2013 that coincides with the full implementation of the last pension reform (Fornero, 2011).

It has been also proved that the simultaneous application of mixed policies (pension and employment policies) would produce a further reduction of the aging burden -in terms of pension costs-. As seen, in a scenario where working careers have been expanded and retirement age adjusted to life expectancy, even a slight increase in employment rates will reduce the Pensioner per Worker Ratio (PWR) and, consequently, the Pension Expenditure Ratio (PER) -particularly in Southern Italy.

Without mixed interventions, population aging will lead to huge increases in public pension expenditure over the next five decades. The projections show that the Pension Expenditure Ratio (PER) in Italy will (at least) rise from 21% to 44% of income between 2016 and 2066 in the absence of changes in labour force participation (ER) and in the Pensioner Ratio (PR). The largest rise is projected for Sardegna, where the PER will grow from 23% to 69% of income during the same period. Future research must focus on the search for tailored made policies that take into account territorial differences on aging, expenditure and employment. For example, active labor market policies for reintegration after childbirth, greater availability of public childcare services and business practices oriented to flexible working hours could be especially important for Southern Italy where pension expenditure will benefit from an increased female participation in labour market activities which is still at very low levels (Calamo and García Pereiro, 2014, 2016).

Population aging also has important implications for the health system. In this case, as stated by Spijker and MacInnes (2013) its sustainability will depend on the capacity to deal with the relationship between morbidity and remaining life expectancy.

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SUMMARY

Aging and pensions in Italy: highlighting regional disparities

Population aging in Italy is well underway. In 2017 the proportion of individuals over 65 years old was around 22.3% and according to the Aging Index (AI) there were 165 over 65 per 100 individuals between 0 and 14 years old. The Italian National Institute of Statistics (ISTAT) estimates that population aged 65 and over is expected to increase to 33% by 2050, while the AI will reach the value of 262.

Italy is becoming one of the oldest countries in the world while its economically active population is shrinking, and such an unstoppable trend is likely to place significant pressure on economic growth and public expenditures due to an increased demand of public health care services and pensions. With data drawn from demographic, labour force, and pension system statistics available from the ISTAT this paper replies Bongaarts' calculations (2004) to estimate the aging burden at different geographical levels (NUTS1&2). Empirical results show that population aging will lead to huge increases in public pension expenditure over the next five decades in the absence of changes in employment (ER) and in the Pensioner Ratio (PR). More targeted interventions will require mixing pension and employment policies to further reduce public expenditure linked to population aging.

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NON-EUROPEAN IMMIGRATION: EUROPEAN PUBLIC OPINION THROUGH MEDIA

Vincenzo Memoli, Venera Tomaselli

1. Introduction

Recent years have witnessed a global surge in anti-immigrant sentiment, and a large proportion of the population now considers immigration as one of the most pressing issues facing their country. In 2015, more than 1 million people arrived in Europe by crossing the Mediterranean sea, compared with 250 thousand in 2014 and 60 thousand in 2013[1]. An increasing trend also appears to characterize asylum seekers. Between 2008 and 2016, the total annual asylum applications in the EU Member States and European Free Trade Association (EFTA) countries have increased by 402% (Migration Policy Institute data)[2]. All these waves of new arrivals have transformed Europe's southern borders into a death trap (Fargues 2015).

At the end of the last Millennium, Hollifield (1997, 30) argued "Few issues have had a greater impact on the politics and society of European nations than immigration". After twenty years, his words seem to resonate within the countries of Europe, conditioning government choices as well as public opinion. Despite the fact that Europe is increasingly becoming more multicultural than in the past (Zick, Pettigrew, and Wagner 2008), familiarity with other cultures does not seem to have attenuated friction between immigrant and host populations to any great extent. In fact, immigration and integration issues have occupied an increasingly central role on the agenda of most European governments (Scheepers, Gijsberts, and Coenders 2002), but the results do not appear to be satisfactory. Today immigrants are still seen as a burden on welfare and employment, or as problems to the host country's culture (Semyonov, Raijman, and Gorodzeisky 2008).

In the context of migration, media coverage linked to specific threats is of particular importance (Hainmueller and Hopkins 2014). The comparison of cultural threats, explained with social identity theory (see Tajfel 1981), with economic threats, which refer to realistic group conflict (Esses, Jackson and Armstrong

[1] See http://data.unhcr.org/mediterranean/regional.php (last access, August 2016).
[2] See http://www.migrationpolicy.org/programs/moving-europe-beyond-crisis (last access, August 2017).

1998), suggest that perceived cultural threats predict anti-immigrant attitudes more than perceived economic threats (Hainmueller and Hopkins 2014).

Unlike past studies, in this paper we focus on the nexus between media and the perception of immigrants, from a longitudinal view. The adoption of a longitudinal perspective is particularly appropriate because the two phenomena are affected by significant changes over time. Longitudinal analysis, then, allows us to trace the dynamics and estimate the effects that can be distinguished by the temporal parameter. Here, using Eurobarometer data (2014-2016), we focalize on the period of immigration crisis. Through multilevel longitudinal models, we estimate the effects of traditional (television, press and radio) and new (website and online social network) media on immigration, measured both in terms of relevance (issues) and as citizens' perception. The main findings show that traditional media as well as new media have a positive effect on citizens' perception for non-European immigrants, also when migration flows to Europe are intensified, making the migration crisis an element of political and social division. Over time, the immigration issue appears metabolized by the media system as well as by public opinion. Therefore, it is possible to hypothesize that:

H_1: the use of traditional media or new media to inquire about politics has a positive effect on citizens' perception of immigration of people from outside the EU, even when the share of immigrants reaching Europe increases.

H_2: Citizens characterised by sentiments favourable to immigration from Europe express a positive sentiment towards non-European immigrants when they frequently use media as a source of political information.

H_3: when citizens evaluate European immigrants positively, they positively assess the immigration of people from outside the EU when they consider the issue of immigration as most important in current politics.

2. Materials and methods

2.1. Materials: data and variables

In order to test our hypotheses we collected Eurobarometer (EB) data to examine anti-immigrant sentiment in a longitudinal perspective[3]. The analysis focuses on the changes in feeling from 2014 until 2016 towards immigration for people from non-EU countries, across 28 EU countries.

[3] For 2014 we use Eurobarometer 82.3, for 2015 we adopt 84.3, and for 2016 Eurobarometer 86.2.

The dependent variable is the 'feeling towards immigration for people outside the EU'[4]. While the measurements focus on the perceived threat, they capture the broader concept of 'attitudes towards the immigrant population' or 'anti-immigrant sentiments'.

Individual-level predictors of attitudes towards immigrants include the following: *Traditional media* is an additive index that aggregates those who use the TV, newspapers and radio to inquire about politics[5]; *New media* is an additive index that aggregates those who use the Website and Online Social Network to inquire about politics[6]; *Feeling towards immigration involving people from other EU member States*[7] and *The issue of immigration.*[8] At aggregate level, the indicator used is the *Number of Refugees*[9].

[4] The questions read as follows: "Please tell me whether each of the following statements evokes a positive or negative feeling for you. *Immigration of people from outside the EU*". The variable is coded in the following way: 1) Very positive, 2) Fairly positive, fairly negative, 4) Very negative. To simplify interpretation, the mode order has been reversed and recoded as follows: 0= fairly negative+very negative, 1= fairly positive+very positive. The "don't know" answers have been excluded from the analysis.

[5] The questions read as follows: "Where do you get most of your news on national political matters?". The response modes for each medium (Television, The written press, Radio, Websites, Online social networks) are: 1) Everyday/Almost everyday, 2) Two or three times a week, 3) About once a week, 4) Two or three times a month, 5) Less often, 6) Never. Each variable was re-coded as follows: 0) Never, 1) Less often/About once a week, 2) Two or three times a week + Everyday/Almost everyday. The index goes from 0 (who never use media to get political information) to 6 (who all use media at least Two or three times a week to get political information).

[6] The questions read as follows: "Where do you get most of your news on national political matters?". The response modes for each medium (Websites, Online social networks) are: 1) Everyday/Almost everyday, 2) Two or three times a week, 3) About once a week, 4) Two or three times a month, 5) Less often, 6) Never. Each variable was re-coded as follow: 0) Never, 1) Less often/About one a week, 2) Two or three times a week + Everyday/Almost everyday. The index goes from 0 (who never use new media to get political information) to 4 (who use all new media at least Two or three times a week to get political information).

[7] The questions read as follows: "Please tell me whether each of the following statements evokes a positive or negative feeling for you. Immigration of people from other EU Member States". The variable is coded in the following way: 1) Very positive, 2) Fairly positive, 3) Fairly negative, 4) Very negative. To simplify interpretation, the mode order has been reversed and recoded with 0= fairly negative + very negative, 1= fairly positive + very positive. The "don't know" answers have been excluded from the analysis.

[8] It is an index aggregating, through polychoric factorial analysis, those who perceive the immigrant issue as the most important issue at a personal, national and European level. It

The test of our research hypotheses is complemented by the use of some control variables. Previous research demonstrated that older, less educated, unemployed, right-wing males, and those living in rural areas, report more negative attitudes toward immigrants (Semyonov, Raijman, and Gorodzeisky 2006). Our control variables include political ideology (from 0=left to10=right) under the assumption that those leaning to the right hold more hostile attitudes towards immigrants, and subjective perceptions of the economic situation[10], which is "more relevant than objective economic indicators for predicting anti-immigrant sentiments" (Kunz 2017, 407). We also considered other controls including socio-demographic variables, assessing the effects of cognitive elements such as education[11], occupation (0=self employed, 1=employed, 2=not working), age (from 15 to 99 years and older), gender (1=man, 2=woman), type of community (0=rural area or village, 1=small/middle town, 2=large town), and social class[12].

2.2. Methods: longitudinal multilevel models for hierarchical data

A linear mixed variance component model (Goldstein 2011) for longitudinal hierarchical data is specified, to examine the changes over time (3 years) in feelings towards immigration (*Y*-dependent variable in the model) of 83287 subjects interviewed across 28-EU countries: 27901 in 2014, 27681 in 2015, and 27705 in 2016. The multilevel approach is employed on the population with a hierarchical structure in which individual units of analysis (respondents) are nested within different countries.

We examine variability in *Y*-variable likely due to differences within-individual variables (1-level-variables) between-countries variables (2-level variables) over a 3-year period. Specifically, two-level models are employed in order to investigate the following research questions:

- what is the shape of *Y* over time?

goes from 0 (immigration is not the most important issue) to 1.014 (immigration is the most important issue).

[9] The indicator includes refugee-like situations. The source is UNHCR.

[10] This is an index, obtained by applying a principal component analysis that aggregates evaluation of the following situations: national and European economy, personal job, financial household. The factor scores obtained go from -2.277 (very bad situation) to 1.787 (very good situation).

[11] The variable is recoded in the following way: 0=No full-time education, 1= Still Studying, 2=up to 15 years, 3=16-19 years, 4=20+.

[12] The variable is coded in the following way: 0= The working class of society, 1=The lower middle class of society, 2=The middle class of society, 3=The upper middle class of society, 4=The higher class of society.

- which within- and between-individual variables explain *Y*?
- how does Y_1 vary according features of 28-EU countries?

In modelling changes in *Y* over time, we assume that subjects have been sampled and observed on many variables over a 3-year period. Within individual data (1-level), we examine relationships involving various time-varying covariates that could affect the feelings towards immigration (*Y*) over time. Time-varying covariates provide a way of accounting for temporal variations in predictors that may change the outcomes predicted by individual covariates over time. Between countries (2-level), we investigate how various individual characteristics are related to changes over time in opinions and feelings.

From a methodological point of view, a linear mixed model (Bryk and Raudenbush 1992; Raudenbush and Bryk 2002) is employed to investigate the random effects of covariates and heterogeneity across the units, both on the variables observed on units at 1-level nested in units at 2-level, and on changes of the observations chronologically ordered in temporal occasions (Skrondal and Rabe-Hesketh 2007). The models assume hierarchical data, with one response variable observed at the lowest level and explanatory variables at other levels, in a hierarchical system of regression equation or random coefficient model (de Leeuw and Kreft 1986). The goal of the analysis is to determine the direct effect of individual and group level explanatory variables, and the moderator role of the explanatory variables at the group level in the study of individual-level relationships. If group level variables moderate lower-level relationships, a statistical interaction between explanatory variables at different levels can likely be estimated.

Temporal dimension is a key factor in understanding how development processes unfold, as well as in observing their impact. Longitudinal data sets allow for investigating multilevel relationships proposed by theoretical models whose effects become more apparent over time. Multilevel models for longitudinal hierarchical or nested data are a straightforward extension of standard multilevel regression models. These models are more specific because the temporal occasions could generate autocorrelated errors (Hox, Moerbeek, and van de Schoot 2018). In a longitudinal perspective, the data from large-scale panel surveys have repeated measures on individuals over time (1-level units) and on countries (2-level units). With this in mind, in this study we employ longitudinal multilevel models to measure the construct under observation on a comparable scale at each time occasion (Singer and Willet 2003). In this multilevel framework, repeated measurements are taken at fixed occasions: all the individuals provided measurements at the same set of occasions, regularly timed, once every year from 2014 to 2016.

The multilevel models for longitudinal data can be written as a sequence of multilevel regression models for each level (Hox, Moerbeek, and van de Schoot 2018). In our study based on repeated measures, to estimate Y_{ti} as response variable for each *i* country observed at *t* year as measurement occasion, the equation is similar to the previous equation (1), with the time at the lowest level and the countries as second level units. The equation at the lowest level is the following:

$$Y_{ti} = \pi_{oi} + \pi_{1i}T_{ti} + \pi_{2i}X_{ti} + \varepsilon_{ti} \quad (1)$$

where:

- π_{oi} is the intercept parameter
- $\pi_{1i}\ T_{ti}$ is the first regression slope coefficient for the explanatory variable associate to a *t* year-time variable T_{ti} for the *i* country observed at *t* year
- $\pi_{2i}X_{ti}$ is a time varying covariate
- ε_{ti} is the residual term.

At the second level, the country's characteristics enter the equation as time invariant covariates.

3. Results and discussion

According to the hypotheses, we specified three models to estimate the effects of predictors entered in each model on feelings towards outside EU immigrants.

Firstly, we estimate the empty or *null* model without any explanatory variable to check if the intra-class correlation ρ verifies enough variance at context level in order to justify the employment of a multilevel analysis (Hox, Moerbeek, and van de Schoot 2018).

In a logistic multilevel model, the intra-class correlation ρ of the *null* model is computed by

$$\rho = \sigma^2 / \sigma^2 * (\pi^2/3) \quad (2)$$

where:

σ^2 is the first level variance and $(\pi^2/3)$ is equal to 3.289 as standard variance of ε_i at first level (Snijders and Bosker 2012).

Since the data set of the present study is large, the minimum threshold for the above intra-class correlation of the *null* model should be higher than 10. By data set, the context level is relevant because the value of ρ computed with σ^2 equal to 0.547715, is 0.547715/(0.547715+3.289)=14.214, higher than 10. As a consequence, we can estimate the following multilevel models.

Specifically, table 1 shows the values of odds ratios (OR) and robust standard errors in a first model, when we estimate the effects of individual-level predictors as single variables, a second model with interaction effects of more variables and the final model with both the effects.

In model 1, the independent variables are the use of traditional media and new media. The new media appears to feed the feeling towards outside EU immigrants in public opinion. When citizens use all new media, at least two or three times a week to get political information, the feeling towards immigrants from outside the EU is more likely to become fairly/very positive than where people use few new media, and infrequently.

Entering control variables in model 1, gender, the economic evaluation aggregate index, large town, all levels of social class, age, and all the positions on the left-right scale are significant, while occupation, small/middle town, and education are not. Specifically for the significant values, female gender (OR=1.115) more likely affects the positive feeling towards outside EU immigrants than male. If the subjective perceptions of the economic situation, measured by the economic evaluation index, are positive, the feeling towards outside EU immigrants is more likely to become more positive (OR=1.369). To live in a large town is a good predictor of feeling and has higher probability (OR=1.160) to affect a positive feeling towards outside EU immigrants than living in a rural area or a village. For whatever level, social class is significant and passing from lower middle class to higher class, all the values of OR (from OR=1.121 for lower middle class to OR=1.659 for higher class) show that the more the level of class increases, the more likely is a positive feeling than among the working class. Age is very significant (p-value<0.001), but the OR is equal to 0.993. In this case, the more age increases the less likely is a positive feeling than when age decreases.

The effect of left-right scale is very interesting. All the positions are significant, but the centre-left (OR=1.633) and centre (OR=1.610) have higher probability to affect a positive feeling towards outside EU immigrants than left and moving to centre-right (OR=0.736), until right (OR=0.685), a negative feeling is more and more likely compared to left.

In model 2, the causal effect on the dependent variable is measured by entering the Refugees number. This latter is significant and the OR is equal to 1.278: the more the number of Refugee increases the more likely it is that the feeling shifts from negative to positive. This trend could show how Europeans have become accustomed to the phenomenon of migration. However, when the immigration issue becomes an important topic for European public opinion, the citizens' feelings towards outside EU immigrants is contracted (OR=0.470). Very significant (p-value<0.001) is the effect of the feelings towards immigrants from

Europe on the positive feelings with an OR equal to 16.591, showing 16.6% more likely to determine a positive feeling than no feeling in non-European immigrants.

In model 2, furthermore, the significance of the control variables is quite similar or less than model 1 for gender, economic evaluation index, large town, age and left-right placement. For social class, only upper middle class and higher class are also significant OR. All the ORs keep greater than 1 values but all decrease, except age, while the OR values for centre-right (OR=0.740) and even more for right (OR=0.781) increase, showing a higher probability to affect a negative feeling than in model 1. Furthermore, a placement towards centre-left (OR=1.553) has a 14% probability of affecting a positive feeling than centre position (OR=1.414), referred left.

In model 3, all the effects are estimated both as single variable and variables in interaction. In model 3 all the previously analysed variables and some interactions between them have been inserted. The interaction effects are estimated, in order to specify the model taking into account whether a conjoint analysis of the single effects makes it possible to use, as predictors, new variables derived from the interactions between the original variables already entered in the model. With this in mind, both traditional media and new media appear to affect attitudes towards outside Europe immigrants. With regard to traditional media, when their use to obtain political information by citizens increases, a clear anti-immigrant feeling is revealed for low levels of Refugees. This confirms that, if people frequently use many traditional forms of media, the probability of negative feelings towards outside EU immigrants increases more than when newer, and fewer traditional media are used, as already shown by the OR value, equal to 1.205 in the model 3.

Unlike the latter, the new media appears to feed a positive attitude towards immigrants in public opinion, at least for high levels of immigration (OR = 1.036). If new media is frequently used, the effect on the negative feeling is confirmed. By contrast, if people frequently use many types of new media, the probability to affect a positive feeling towards outside EU immigrants increases more than when few new media are used, or in the case of never.

A positive trend is found when we look at the marginal effects of feeling in European immigrants defined by new media. The interaction between the variables affects the positive feeling even if it loses strength as many new media are frequently used (the values of the indicator increases from 0 to 4) and the feeling in European immigrants increases. In other words, by contrast with Diamanti (2016), among European countries new media appear to support citizens' perception of immigrants, especially of those that come from non-European countries.

By checking the empirical findings, it should be noted that, when the economy is positively perceived, public opinion expresses a positive sentiment towards outside European immigrants (OR=1.196). This tendency is found among those

who live in large cities (OR=1.110) and those belonging to high social classes. If the fears towards non-European immigrants prevail among the elderly, this attitude is reversed for those in the centre and centre-left political space. As we expected, the more citizens are on the right political space, the greater is their propensity to take on an anti-immigrant sentiment.

4. Conclusions

In this work, analysing the data collected by the Eurobarometer on public opinion between 2014 and 2016, it emerges that the media, while diversified in action, affects the perception that citizens have of immigrants. New media, when used more frequently, at least two or three times a week to obtain political information, feed a positive sentiment towards immigrants outside the EU for high levels of immigration. As for traditional media, while managing to soften the negative sentiment towards non-European immigrants, at least for low levels of immigration, unlike the new media, they fail to bring Europeans closer to their feelings of affection and sentiment. These results appear of undoubted importance, because despite the amount of information that travels through digital media, and despite cases of fake news, citizens are able to learn and understand better what is happening in the world.

Our results show how media use can shift public perceptions of immigration. The portraits of immigrants, especially in the new media, do not seem to generate the feeling that a social crisis is taking shape. However, these results must be treated with caution, and represent a first step in an in-depth study of the link between immigration and media use indicators. New research should deepen this union by shedding light on the dynamics that develop in the joint use of traditional media and new media. As for member countries and Europe itself, they are far from having solved the immigration problem. It will still take time for immigration to be perceived by public opinion in less utilitarian and inhuman terms. Meanwhile, the media, especially digital ones, will be able to offer their own contributions in real time, informing citizens and sensitizing those who, even today, do not see their own selves reflected in the mirror of the other.

Table 1 Feeling towards immigration of people from outside the EU (*Y*-dependent variable).

	Model 1		Model 2		Model 3	
	O.R.	Robust St. Err.	O.R.	Robust St. Err.	O.R.	Robust St. Err.
Traditional media (never use)	0.997	0.016			0.783*	0.090
New media (never use)	1.040*	0.019			0.785	0.109
Number of Refugees (log.)			1.278***	0.063	1.205***	0.056
Traditional media Number of Refugees (log.)*					1.023*	0.010
New media Number of Refugees (log.)*					1.036**	0.011
Feeling European immigrant			16.591***	2.290	21.943***	
*Feeling European immigrant * Traditional media*					0.968	0.041
*Feeling European immigrant*New media*					0.864*	0.059
Immigration issue			0.470***	0.030	0.777	0.122
*Feeling European immigrant*Immigrants' issue*					0.549**	0.099
Gender (man)	1.115**	0.040	1.192***	0.047	1.192***	0.047
Occupation (self employed)						
employed	0.938	0.047	1.041	0.057	1.044	0.057
not working	0.923	0.039	0.997	0.046	0.994	0.046
Economic evaluation index	1.369***	0.034	1.191***	0.028	1.196***	0.029
Type of community (rural area or village)						
small/middle town	1.044	0.043	1.005	0.046	1.002	0.045
large town	1.160**	0.062	1.115*	0.057	1.110*	0.057
Social Class (working class)						
lower middle class	1.121*	0.063	1.048	0.063	1.052	0.063
middle class	1.168**	0.064	1.103	0.062	1.109	0.061
upper middle class	1.460***	0.108	1.250**	0.091	1.264**	0.090
higher class	1.659***	0.220	1.519**	0.222	1.522**	0.227
Still Studying	1.272	0.247	0.856	0.165	0.863	0.167
up to 15 years	0.788	0.143	0.718	0.128	0.721	0.131
16-19 years	0.873	0.166	0.719	0.126	0.725	0.129
20+	1.153	0.199	0.805	0.136	0.814	0.139
Age	0.993***	0.002	0.993***	0.002	0.993***	0.002
Left right scale (left)						
centre left	1.633***	0.137	1.553***	0.127	1.556***	0.126
centre	1.610***	0.093	1.414***	0.082	1.415***	0.082
centre right	0.736***	0.039	0.740***	0.039	0.740***	0.039
right	0.685***	0.070	0.781**	0.070	0.776**	0.070
Constant	0.511**	0.124	0.008***	0.005	0.012***	0.007
var (time)	15.965	15.753	14.555	11.885	14.221	11.629
var (cons)	0.373	0.091	0.212	0.073	0.209	0.072
	30,61		30,61		30,61	
Numbers of group	56		56		56	
Wald (sig.)	0.000		0.000		0.000	

Note: * p<0.05; **p<0.01; ***p<0.001

Source: EUROSTAT, Eurobarometer 2014-2016.

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SUMMARY

Non-European immigration: European public opinion through media

Several studies in different scientific fields addressing the research question offer controversial results on the media role. In this paper, the sentiment that European public opinion has about non-European immigration is analysed by data of three *Eurobarometer* waves from 2014 to 2016 focusing on the period of immigration crisis**.**

Through multilevel longitudinal models, the effects of traditional (television, press and radio) and new (website and online social network) media on citizens' perception are estimated. Specifying longitudinal multilevel models based on research hypotheses about the link between citizens' immigration perception and media use, the estimation of the parameters reveals significant implications of the media communication skills in affecting the European citizens' sentiment about non-European immigration.

The main findings show that the use of traditional media (TV, press and radio) and new media (website and online social networks) helps to bring closer and consolidate the relationship between citizen and 'foreigner', even when the European migration crisis reaches high levels and the migration issue becomes heated for public opinion. Furthermore, when new media is used frequently to obtain political information, a positive sentiment towards immigrants outside the EU for high levels of immigration is common.

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IL FENOMENO DEI RIFUGIATI IN EUROPA: INDAGINE SU PERCEZIONE E ATTEGGIAMENTI NEL MONDO CATTOLICO

Gian Carlo Blangiardo, Simona Maria Mirabelli

1. Introduzione

Nel 2016 si stima che siano oltre 65 milioni le persone costrette ad abbandonare il proprio Paese a seguito di persecuzioni, guerre, violenze o violazione dei diritti umani (UNHCR, 2017). L'afflusso di migranti provenienti da aree caratterizzate da conflitti e crisi umanitarie (Africa, Medio Oriente e Asia) è in continua crescita, un aumento che è andato di pari passo con le domande di asilo inoltrate nei Paesi UE. Secondo i dati di fonte Eurostat nel 2016 se ne contavano complessivamente 1.261 mila con una crescita del 193% rispetto al dato del 2013 (431 mila unità) e un impatto differenziale sui Paesi che ne fanno parte altrettanto significativo. Alcuni Stati membri dell'Unione Europea (come la Grecia, l'Italia e l'Austria) o limitrofi ad essa (come la Serbia, dopo l'apertura della "rotta balcanica" nell'estate del 2015) o la Turchia (che alla fine dello stesso anno ospitava oltre 2 milioni di profughi di origine prevalentemente siriana) sono stati attraversati dalla quasi totalità dei flussi determinando una condizione di squilibrio tra i Paesi destinatari delle domande di asilo. In risposta a questa situazione gli Stati più coinvolti (Ungheria, Austria, Germania, Francia, Regno Unito, Croazia, Svezia, Danimarca) hanno adottato politiche migratorie restrittive con la chiusura o la reintroduzione dei controlli alle frontiere con i Paesi da cui proviene il maggior flusso di migranti. Anche in Italia il numero di richiedenti asilo risulta in aumento: dopo i ricongiungimenti familiari essa rappresenta la seconda motivazione di ingresso di cittadini non comunitari (ISMU, 2018). Nel 2017 le domande di asilo hanno superato 130mila unità, il numero più alto registrato in Italia, quasi cinque volte superiore a quello raggiunto nel 2013 (26mila).

Di fronte a questo scenario e alla mutevole complessità che lo caratterizza l'attenzione dei ricercatori si è notevolmente accresciuta, di pari passo agli studi dedicati al fenomeno. La prospettiva con cui si analizzano gli effetti sulle comunità maggiormente coinvolte è generalmente di tipo quantitativo: la consistenza numerica dei flussi migratori e la loro dinamica rappresentano la chiave di lettura privilegiata. Tuttavia, altre dimensioni entrano in gioco nell'analisi di questa realtà,

come quella che riguarda la percezione di chi interpreta l'arrivo di migranti e richiedenti asilo come una opportunità di testimonianza concreta della fede cristiana e di rispetto delle altre confessioni religiose.

2. Il *background* dello studio

Nell'autunno del 2015 il Consiglio delle Conferenze Episcopali d'Europa (CCEE) insieme alla Commissione Internazionale Cattolica per le Migrazioni (ICMC) ha condotto un'indagine con l'obiettivo di delineare un quadro preciso circa la risposta della Chiesa all'attuale crisi dei migranti e dei rifugiati in Europa. All'iniziativa hanno partecipato le Conferenze Episcopali di 24 Paesi europei: Austria, Belgio, Danimarca, Finlandia, Francia, Germania, Grecia, Gran Bretagna, Irlanda, Islanda, Italia, Lituania, Lussemburgo, Malta, Moldavia, Polonia, Portogallo, Slovenia, Spagna, Svezia, Svizzera, Turchia, Ucraina e Ungheria. I risultati cui l'indagine è pervenuta hanno dimostrato che la Chiesa Cattolica, grazie alla sua lunga e comprovata esperienza nel prestare aiuto a rifugiati e migranti nei Paesi di partenza e in quelli di origine, ha saputo costruire modelli operativi adeguati ad affrontare il fenomeno, anche attraverso nuove forme di collaborazione (ICMC e CCEE, 2016). Dal punto di vista operativo i soggetti coinvolti nella gestione dell'accoglienza dei richiedenti asilo e nelle attività che ne facilitano l'inclusione nel nuovo contesto di vita e lavoro (come le parrocchie, le congregazioni religiose, i volontari, le diocesi) hanno risposto con grande disponibilità alla sfida del nostro tempo offrendo servizi di cura immediata e attivando azioni a lungo termine a sostegno del dialogo, della coesione sociale, della solidarietà. Nel corso del 2016 il Consiglio delle Conferenze Episcopali d'Europa ha riproposto l'iniziativa di ricerca coinvolgendo un più ampio numero di Conferenze Episcopali che hanno risposto, con dovizia di dati e informazioni sul fenomeno, compilando un questionario composto da otto domande aperte, le cui risposte sostanziano la documentazione che ha reso possibile l'analisi qualitativa proposta nel presente lavoro.

Obiettivo generale del presente lavoro è quello di analizzare, a livello qualitativo, i resoconti dell'Indagine CCEE 2016 con il supporto di un software specifico per l'analisi di testi, a partire da alcuni dati di contesto relativi ai Paesi cui fanno capo le Conferenze Episcopali coinvolte. Tale approccio rientra nella metodologia della *Grounded Theory* che si colloca nell'ambito della ricerca sociale ispirata al paradigma interpretativo.

3. L'analisi qualitativa. I nuclei tematici

Al fine di sviluppare uno schema concettuale intelligibile degli aspetti messi in campo nel presente lavoro di ricerca, attraverso la scomposizione e la ricomposizione in unità di significato delle risposte fornite dai Segretari Generali delle Conferenze Episcopali Europee (CCEE) al questionario predisposto per l'Indagine 2016, sono stati individuati otto nuclei tematici (*Nodes*) di cui quattro direttamente riferibili alle azioni intraprese dalla Chiesa Cattolica in risposta al fenomeno in esame: "*Il fenomeno dei migranti e dei rifugiati*"; "*Bisogni e criticità*"; "*L'informazione. Il ruolo dei mass-media*"; "*Percezione e atteggiamento della popolazione autoctona*"; "*Azioni e interventi della Chiesa Cattolica a sostegno di migranti, rifugiati e richiedenti asilo*"; "*Azioni e interventi della Chiesa Cattolica a sostegno degli emigranti*"; "*Il dialogo inter-religioso e inter-culturale*"; "*Le relazioni della Chiesa Cattolica con lo Stato e l'Autorità pubblica*". Nelle pagine che seguono si propone un'interpretazione dei risultati ottenuti con l'ausilio del Programma adottato nel presente lavoro (NVIvo. *Non-numerical Unstructered Data*Indexing, Searching and Theorizing Vivo*), riportando per le prime quattro unità tematiche, cui è circoscritta l'analisi proposta nei paragrafi che seguono, le seguenti informazioni: il numero delle fonti selezionate (*Sources*); il numero dei segmenti di testo codificati al loro interno (*References*); la domanda del questionario (*Question*); la presenza di eventuali dati mancanti (*Cases. No data*); i termini più ricorrenti con indicazione del numero di volte in cui ciascuno di essi compare nel nucleo tematico di riferimento (*Word Frequency*); la corrispondente visualizzazione grafica (*Words Cloud*); la sintesi del contenuto informativo (codificato e categorizzato) in relazione a ciascun Paese.

L'analisi dei quattro nuclei tematici è stata orientata a: 1) individuare le parole più ricorrenti, con i significati che esse veicolano, a seconda del contesto (unità tematica) in cui le stesse si collocano[1]; 2) identificare eventuali relazioni tra i diversi contenuti informativi resi disponibili; 3) dar conto della variabilità dei giudizi e delle opinioni espresse dai rispondenti rispetto alle tematiche in esame.

3.1. Il fenomeno dei migranti e dei rifugiati

Il primo nucleo tematico attiene alla quantificazione del fenomeno e ai suoi aspetti descrittivi: le caratteristiche del Paese rispetto al tipo di migrazione, la dinamicità del flusso migratorio, la presenza di gruppi vulnerabili. Alla domanda: *"Da dove vengono la maggioranza dei migranti o rifugiati che arrivano al vostro Paese? Ci sono cifre ufficiali?"*, le 32 Conferenze Episcopali coinvolte

[1] Vedi Figure 1-4.

nell'Indagine 2016 ne specificano la provenienza e la loro rilevanza dal punto di vista numerico (Francia, Croazia, Inghilterra e Galles, Islanda, Svezia, Austria, Grecia, Italia, Spagna). Alcuni segnalano l'aumento dei flussi migratori in entrata (Grecia) e in uscita dal Paese (Ucraina); altri la loro diminuzione (Malta, Ungheria); altri ancora evidenziano il saldo migratorio che ne deriva (positivo per quanto riguarda l'Inghilterra e l'Austria). Gli intervistati specificano altresì come si caratterizza il Paese in relazione al flusso che lo attraversa. Sono Paesi di transito: Austria, Repubblica Ceca, Albania e Bulgaria; sono Paesi di ricollocazione: Francia e Portogallo. A tale riguardo la Croazia, la Spagna, la Repubblica Ceca si connotano sia come Paese di destinazione, sia come Paese di transito. Altri elementi informativi contenuti nelle risposte riguardano particolari segmenti di popolazione: la presenza di uomini giovani (Germania); di nuclei familiari (Lithuania, Repubblica Ceca); di minori non accompagnati (Bulgaria, Italia); di donne (Grecia), di persone prive di titolo di soggiorno (Bulgaria, Spagna); di migranti di fede musulmana (Lettonia). Le Conferenze Episcopali della Svezia e della Danimarca riferiscono altri elementi informativi che attengono agli aspetti securitari del fenomeno: l'adozione di politiche migratorie restrittive, l'azione di controllo e sorveglianza delle frontiere.

Figura 1 – *Words Cloud: "Il fenomeno dei migranti e dei rifugiati". Word Frequency Criteria: Display words 50 most frequent with minimum length 7.*

SOURCES: 32; REFERENCES: 86; QUESTION: ***"[...] Da dove vengono la maggioranza dei migranti o rifugiati che arrivano al vostro Paese? Ci sono cifre ufficiali?"****; CASES. No Data By: Irlanda; WORD FREQUENCY (AT LEAST 10 WORDS): Rifugiati (39) Persone (28) Migranti (15) Richiedenti (15) Migrants (14) Refugees (14) Profughi (11) Stato (10).*

3.2. Bisogni e criticità

Il secondo nucleo tematico si focalizza sulle criticità connesse al flusso di migranti, rifugiati e richiedenti asilo che coinvolge i contesti in esame. Gli aspetti problematici più ricorrenti riguardano: l'accoglienza dei richiedenti asilo, l'azione di governo, la presenza di soggetti vulnerabili, le condizioni di vita della popolazione, l'informazione veicolata attraverso i mezzi di comunicazione di massa, la dimensione del fenomeno. Alla domanda: *"Quali sono le questioni più urgenti che riguardano migranti e rifugiati nel Suo Paese?"*, le Conferenze episcopali dell'area Mediterranea restituiscono un quadro piuttosto complesso per la compresenza di una pluralità di problematiche osservate all'epoca della rilevazione. La Grecia, in particolare, riferisce situazioni di povertà diffusa che riguardano non solo gli immigrati ma anche il resto della popolazione. Anche la Spagna e il Portogallo si soffermano su aspetti che attengono alla cittadinanza nel suo complesso: il problema della coesione sociale, il lavoro, le misure di integrazione necessarie per una convivenza pacifica tra le diverse comunità che vi risiedono, il ruolo dell'informazione. L'Italia si sofferma sulle criticità burocratiche connesse alla domanda di rilascio del permesso di soggiorno e sulla presenza di fasce di popolazione strutturalmente fragili per l'assenza di familiari che se ne prendono cura (i minori stranieri non accompagnati).

Figura 2 – *Words Cloud: "Bisogni e criticità". Word Frequency Criteria: Display words 50 most frequent with minimum length 7.*

SOURCES: 29; REFERENCES: 62; QUESTION: ***"Quali sono, in questo momento, le questioni più urgenti che riguardano migranti e rifugiati nel Suo Paese?*** *[...]";*

CASES. NO DATA BY: Romania, Svizzera, Ungheria;WORDS FREQUENCY (AT LEAST 10 WORDS): Persone (16); Rifugiati (15); Chiesa (10); Migranti (10), Refugees (10).

3.3. L'informazione. Il ruolo di mass-media

Con il terzo nucleo tematico si indaga il ruolo dell'informazione nella conoscenza e rappresentazione del fenomeno nei diversi contesti territoriali. Alla domanda: *"Come vede il ruolo della comunicazione sociale nel comunicare sia le tensioni che i segni positivi di integrazione?"* i rispondenti evidenziano, da un lato, il livello di adeguatezza della comunicazione sociale rispetto ai contenuti che è in grado di diffondere e agli effetti che produce sull'opinione pubblica; dall'altro, il ruolo che la Chiesa svolge nel campo della comunicazione sociale attraverso gli strumenti con cui le organizzazioni cattoliche e le stesse diocesi operano sul territorio all'interno delle singole comunità (corsi di formazione, documentari, mostre *ad hoc*, giornate dedicate).

Figura 3 – *Words Cloud: "L'informazione. Il ruolo dei mass-media". Word Frequency Criteria: Display words 50 most frequent with minimum length 7.*

SOURCES: 24; REFERENCES: 68; QUESTION: ***"Come vede il ruolo della comunicazione sociale nel comunicare sia le tensioni che i segni positivi di integrazione?";*** CASES. NO DATA BY: Albania, Finlandia, Irlanda, Lithuania, Lussemburgo, Malta, Polonia, Svezia; WORD FREQUENCY (AT LEAST 10 WORDS): Social Media (23) Comunicazione Sociale (18) Rifugiati (16) Refugees (12) Migranti (11) Refugee (10).

La qualità dell'informazione è ritenuta ambivalente, in grado di influenzare l'opinione pubblica in entrambi i sensi in Danimarca, Inghilterra, Austria, Ungheria e Croazia. È considerata adeguata in Belgio, Bulgaria, Lettonia, Slovenia e nell'area balcanica comprendente il Kosovo, la Macedonia, il Montenegro e la

Serbia. Risulta inadeguata in Moldavia e in Spagna. Circa il carattere oggettivo dell'informazione, se ne ribadisce l'importanza e la necessità in Turchia, Grecia e Italia. Per quanto riguarda il ruolo della Chiesa Cattolica nel campo dell'informazione, esso è considerato rilevante in Inghilterra, Islanda, Francia, Germania, Svizzera, Ucraina, Italia, Spagna, e nell'area balcanica comprendente il Kosovo, la Macedonia, il Montenegro e la Serbia; specifico al tema delle migrazioni in Austria; limitato nella Repubblica Ceca.

3.4. Percezione e atteggiamento della popolazione autoctona

Il quarto nucleo tematico si focalizza sulla percezione della popolazione autoctona nei confronti dei migranti e dei richiedenti asilo. I contenuti delle risposte al tema riguardano: il tipo di percezione; l'orientamento dell'opinione pubblica; gli atteggiamenti e le diverse reazioni nei confronti dei *new comers* (accoglienza, sostegno, inclusione, solidarietà, ma anche insicurezza, paura, rifiuto); le tensioni generate da fattori contingenti di natura socio-economica (come la condizione di povertà diffusa tra la popolazione, la competizione per l'accesso alle risorse, il lavoro, ecc.) o di origine religiosa (il fenomeno della Islamofobia); l'arrivo di migranti e rifugiati e la loro concentrazione dal punto di vista territoriale (la presenza di bidonville); l'emergere di situazioni di conflittualità (intra e inter-gruppo).

Figura 4 – *Words Cloud: "La percezione della popolazione autoctona". Word Frequency Criteria: Display words 50 most frequent with minimum length 7.*

SOURCES: 30; REFERENCES: 69; QUESTION: ***"Qual è la percezione e l'atteggiamento della gente del proprio Paese verso i migranti e rifugiati? Si sono notate tensioni recenti tra i migranti/rifugiati e la popolazione del vostro Paese? Ci***

sono esempi belli da testimoniare d'accoglienza e apertura? ci sono paure? quali? Si sta facendo qualcosa per affrontare l'inevitabile dialogo tra culture e forse tra religioni?"; CASES. NO DATA BY: Irlanda, Lettonia; WORD FREQUENCY (AT LEAST 10 WORDS): Migranti (26); Refugees (20); Migrants (19); Rifugiati (17); Popolazione (13); People (12); Persone (10); Società (10).

Sulla base delle risposte date alla domanda del questionario: *"Qual è la percezione e l'atteggiamento della gente del proprio Paese verso i migranti e rifugiati? Si sono notate tensioni recenti tra i migranti/rifugiati e la popolazione del vostro Paese? Ci sono esempi belli da testimoniare d'accoglienza e apertura? ci sono paure? quali? Si sta facendo qualcosa per affrontare l'inevitabile dialogo tra culture e forse tra religioni?"*, emerge che nella maggior parte dei casi prevalgono sentimenti e reazioni negative: è quanto accade in Belgio, Croazia, Francia, Danimarca, Svezia, Svizzera, Grecia, Italia, Ungheria e Polonia. Sembrano invece prevalere sentimenti positivi in altre realtà come in Lussemburgo, Malta, Portogallo, Spagna e Slovenia. Per alcuni paesi si segnalano situazioni polarizzate: l'opinione pubblica sembrerebbe divisa tra solidarietà e paura nei confronti dell'alterità in Finlandia, Germania, Inghilterra, Islanda, Austria e Bulgaria. La percezione della popolazione autoctona è mutata nel corso tempo in Turchia e cambia a seconda del tipo di popolazione straniera con cui essa si confronta (nella Repubblica Ceca, Slovacchia, Lithuania e Ucraina si evidenzia una preferenza per i migranti di religione cristiana). Atteggiamenti di indifferenza e distacco sono espressi dagli abitanti della Moldavia e dell'area comprendente Serbia, Macedonia, Montenegro e Kosovo. Non si segnalano reazioni (né di segno positivo né di segno negativo) tra gli abitanti della Albania, trattandosi di un tipo di migrazione che transita dal Paese senza entrare in contatto con chi vi abita.

4. Focus sulla parola-chiave *Integrazione*

Lo studio si è poi focalizzato sull'analisi di alcune parole-chiave di cui si fornisce, a titolo esemplificativo, lo specifico contesto semantico emerso riguardo al termine *Integrazione*. La ricerca del termine nelle risposte date al questionario ha permesso di individuare il significato che il verbo e la sua parola derivata *Integrazione* assumono in relazione al nucleo tematico cui si riferiscono[2]. Ne è

[2] Nelle parole del Pontefice *Integrare* vuol dire sostenere un processo che "si fonda sul mutuo riconoscimento della ricchezza dell'altro" e "che può essere accelerato attraverso l'offerta di cittadinanza […] e di percorsi di regolarizzazione […]" (Discorso del Santo Padre ai partecipanti al

risultato un quadro disomogeneo nel quale l'elemento comune, in grado di cogliere le diverse prospettive con cui analizzare la risposta della Chiesa Cattolica al fenomeno dei rifugiati e dei richiedenti asilo, è rappresentato dall'attenzione con cui l'Istituzione religiosa guarda alle situazioni di criticità cui sono esposte le fasce di popolazioni più vulnerabili. Riguardo all'unità tematica che attiene alla quantificazione del fenomeno e ai suoi aspetti descrittivi (*Il fenomeno dei migranti e dei rifugiati*), il termine è connesso all'azione di governo (Lettonia e Croazia) e all'approvazione del piano per l'integrazione sociale ed economica dei richiedenti asilo (Lettonia). In tema di *Bisogni e Criticità*, il termine è associato alle maggiori difficoltà di integrarsi per alcune provenienze rispetto ad altre (Spagna), al bisogno della società di creare le condizioni di integrazione per coloro cui è permesso di risiedere nel Paese (Svezia). Riguardo alla comunicazione sociale, la parola è collegata al ruolo dei mass-media nel diffondere le informazioni (Inghilterra e Galles) e alla possibilità della Chiesa di comunicare esempi positivi di integrazione (Repubblica Ceca). In tema di percezione della popolazione autoctona nei confronti dei migranti e dei richiedenti asilo, la parola *Integrazione* è posta in relazione alle differenze culturali e religiose che non facilitano il processo di integrazione tra autoctoni e migranti (Slovacchia) e alla "paura dell'altro" diffusa dai mezzi di comunicazione di massa (Inghilterra e Galles). Riguardo al sostegno dei migranti e rifugiati da parte della Chiesa Cattolica, il termine è connesso alle attività educative e assistenziali svolte dall'Istituzione religiosa per la ricerca del lavoro e della casa (Grecia), al sostegno individuale rivolto ai migranti accolti nel Paese (Slovacchia), all'integrazione sociale di coloro che fuggono da contesti di guerra (Spagna), al ruolo complementare e subordinato alle risorse della Chiesa (Croazia), all'inclusione dei migranti e dei rifugiati al suo interno e nella comunità (Inghilterra e Galles), al sostegno della Chiesa affinché la convivenza tra persone con un diverso *background* culturale sia pacifica (Germania), al benessere della società nel suo insieme (Germania), all'importanza della famiglia nel processo di integrazione (Irlanda), ai servizi erogati dalla Caritas (Repubblica Ceca). Riguardo al sostegno di coloro che sono emigrati, il termine è associato all'attività sacerdotale di accompagnamento nelle comunità cattoliche dei Paesi europei (Romania); in tema di dialogo inter-religioso e inter-culturale, la parola ricorre in relazione a un progetto interculturale che coinvolge la Chiesa Cattolica, quella luterana e la congregazione musulmana (Svezia). Infine, per quanto riguarda le relazioni che intercorrono tra la Chiesa e lo Stato, il termine *integrazione* si riferisce alla collaborazione tra la Caritas e le Istituzioni statali per la realizzazione di misure a sostegno dei profughi (Bulgaria), alla costruzione di esperienze di

Forum Internazionale "Migrazioni e Pace", 21 febbraio 2017; Messaggio del Santo Padre per la Giornata Mondiale del migrante e del rifugiato 2018, 15 agosto 2017).

inclusione sociale attraverso i progetti della Fondazione Migrantes e della Caritas (Italia), ai bisogni identificati dal Governo e alla disponibilità della Chiesa a collaborare compatibilmente con le risorse a sua disposizione (Croazia), alla Caritas nel ruolo di *provider* di servizi di integrazione riconosciuto dallo Stato (Repubblica Ceca), alla stretta collaborazione tra Chiesa e Governo nelle attività a sostegno di migranti e rifugiati (Svezia).

5. Conclusioni

I risultati cui siamo pervenuti riflettono indubbiamente il contesto migratorio che caratterizza le realtà territoriali coinvolte nell'Indagine: la consistenza del fenomeno, la sua evoluzione nel corso del tempo, le specificità con cui lo stesso si è manifestato. Anche dal punto di vista lessicale, le differenti denominazioni attribuite ai soggetti che ne fanno parte e che variano a seconda del contesto linguistico in cui ricorrono (migrante, rifugiato, richiedente asilo nel linguaggio formale; immigrato, clandestino, profugo nella lingua comune e nell'informazione) influiscono sensibilmente sulla percezione del fenomeno. Allo stesso modo, le condizioni economiche del Paese, il suo *background* storico-culturale, le scelte di governo adottate in tema di immigrazione, l'esistenza di minoranze etniche già presenti sul territorio assumono rilevanza nello sviluppo dei processi cognitivi. Ed è questo il contesto in cui l'analisi proposta intende collocarsi: dare conto della rappresentazione e della percezione del fenomeno assumendo la prospettiva di chi osserva, descrive e interpreta l'arrivo di migranti e richiedenti asilo come una opportunità di testimonianza concreta della fede cristiana e di rispetto delle altre confessioni religiose.

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SUMMARY

The phenomenon of refugees in Europe: Survey on perception and attitudes in the catholic world

In 2016, more than 65 million people worldwide are living outside their country due to persecution, war, violence or violation of human rights (UNHCR, 2017). The growth of flows is strictly connected to the asylum applications to EU countries. According to this scenario and its ever-changing complexity, the researchers' attention has greatly increased, in parallel with the studies concerning the migratory phenomenon. The perspective of the analysis is generally quantitative: the numerical consistency of migratory flows and their dynamics are the usual key. However, other dimensions may come into play, such as the perception of those religious Institutions looking at migrants and asylum seekers as an opportunity to be witness of the Christian faith and the respect for other religions.

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DRIVERS OF MIGRATION FLOWS FOR COMPANIES: AN INTEGRATED ANALYSIS

Massimiliano Serati, Andrea Venegoni

1. Introduction

Due to changes in markets, consumer preferences, environmental regulations and technological progress, firms are constantly adjusting to new situations. The location choice is a particular form of strategic adjustment that a firm must make (Pellenbarg, 2005).

The existing works address the location decision-making process both theoretically and empirically, with the former stream of literature sketching out, mainly through discrete-choice models, how firms select their location, and the latter assessing what have been the trajectories followed by firms in the relocation processes hitherto experienced and the factors underlying them.

Focusing on the second, where our research fits in, studies that focus on this phenomenon have flourished since the sixties, and they aim at describing the relocation patterns across a single country. The main empirical approach employed relies on spatial models, which are the ones best suited to responding to such a need in a well-defined geographical space.

The evidence gathered by such research does not reach a concluding agreement on the factors that drive a firm's location choices, but each focuses on a few aspects that contribute to them. This approach made it impossible to understand what the determinants of the phenomenon studied really are and to rank them in their order of importance. We cannot even be sure that all the factors enumerated in the literature truly have a role in determining a firm's choice of location. This is because each work employs a limited number of variables separately, omitting others that might exert a relevant influence on the studied dynamics, hence impairing the statistical robustness of the analysis.

Notwithstanding this, much interesting evidence has been gathered in such works. For what concerns the geographical trends, there is substantial agreement on the fact that firms have tended to move from core regions to the periphery in the past and are nowadays reverting this trend, at least within the single country (Pellenbarg, 2005). Moving to the analyses of the drivers that determine such

changes, different evidence appears according to the geographical aggregation level at which the analysis is performed.

Regarding the regional/state level, which is the dimension we focus on, factors like knowledge spillovers (Autant-Bernard, 2006, Ferreira et al., 2017), land area availability (Holl and Mariotti, 2018), concentration of manufacturing activity (Pablo-Martì and Arauzo-Carod, 2018, Mota and Brandao, 2013), per-capita income (Manjòn and Arauzo-Carod, 2011), market size (Mota and Brandao, 2013), academic research (Autant-Bernard, 2006) and productivity (Artz et al., 2016) play a dominant role as drivers of firm location. On the down side, features that hinder the attractiveness of such geographical areas are the unionization level (Suarez Serrato and Zidar, 2016), low wages and high corporate and labour taxes (Suarez Serrato and Zidar 2016, Morkuté and Koster, 2018).

Our analysis focuses on the regional level, as is carried out on the Italian NUTS 2 territories (namely, regions) and it tries to provide a thorough assessment of the factors that drive the location choices of firms in such a territory. To do this, we resort to a model that allows for considering a large number of variables that describe economic, social, demographic and infrastructural characteristics of any NUTS 2 entity. In this way, our approach allows for fixing the omitted variables bias affecting existing works and frees it from any a priori assumption on the impact that any of the elements considered might exert on the studied phenomenon.

The empirical model we build up in order to fulfill our stated purpose is a dynamic factor model (DFM) in the spirit of Stock and Watson (2011). The choice of such a framework enables us to (i) include in our analysis a large number of variables able to describe many features of the diverse territorial entities, (ii) not to impose any a priori restriction on our empirical model, (iii) to rank any single factor included basing on its influence on the territorial performance in firm attractiveness and, finally, (iv) to rank each NUTS 2 entity analyzed on the basis of its performance in firm attractiveness.

The findings we obtain, thanks to such an empirical setup, allow us to affirm that the main critical success factors for a territory to be attractive for a firm's location choice are the existing infrastructure, the presence of high-skilled human capital and, consequently, a higher propensity to innovation, while the main anchors to mediocrity are represented by the presence of the brain drain phenomena (migration of young skilled workers), a stagnant labour market and low education levels.

2. Study Design

Our empirical analysis is structured in two parts. The first consists of the estimation of an indicator of regional firm attractiveness for each geographical unit through the application of a DFM model. After having done this, we analyse the factor loadings in order to understand what the contribution is of every single variable considered in determining the regional ability to catalyze the location of firms.

2.1 Uncovering the factors that drive regional attractiveness for the location choices of firms in Italy

In order to answer our research question and, hence, to understand what the factors are that enhance the ability of a given territory (in this case of regions) to influence the location choice of firms, we employ a model that is able to condense the information of a large number of variables into a single indicator that synthesizes a measure of regional firm attractiveness. Doing this, we can infer from the loadings of the process the contribution each variable makes to the final indicator, hence obtaining a measure of the contribution of each feature analysed to the attractiveness performance of the NUTS 2 territories.

To summarize, we estimate a dynamic factor for each of the Italian 21 NUTS 2 entities[1], in order to be able to rank them and to analyze how each of the variables considered affects every geographical unit included in the analysis.

DFM are a useful tool, as they allow for handling many series and higher dimensional factor spaces under weak conditions on distributions and correlations among the idiosyncratic terms. The key insight behind the nonparametric methods for estimation of DFMs is that when the number of variables is large, cross-sectional variation alone can be exploited to estimate the space spanned by the factors (Stock and Watson, 2011).

From among all the possible estimation techniques available to perform a DFM analysis, we resort to a Bayesian approach, given the scarce dimensionality of our timespan. For the algebraic formalization of the model, we redirect the reader to

[1] There are 21 Italian NUTS 2 territories because of the separation of the Bolzano and Trento provinces in this classification. Hence the full list of NUTS 2 elements considered is: Piedmont, Lombardy, Aosta Valley, Liguria, Veneto, Autonomous province of Trento, Autonomous province of Bolzano, Friuli Venezia Giulia, Emilia Romagna, Tuscany, Lazio, Marche, Umbria, Abruzzo, Campania, Molise, Basilicata, Apulia, Calabria, Sicily, Sardinia.

Stock and Watson (2011), as well as for the discussion of the alternative estimation approaches possible. The Bayesian specification resembles that of Koop and Potter (2004), employing natural conjugate priors for parameters estimation.

2.2 Sample selection

In order to fulfill our purpose and implement a DFM, we consider more than 20 variables for each NUTS 2 unit (precisely, 26). The variables considered cover all the factors found in the literature as possible drivers of the phenomenon studied. Precisely, we have taken from OECD and Eurostat databases data related to economic wellbeing and quality of life, infrastructures and transportation, productive structure and labor market, ICT and innovation and, finally, demography and the social environment. They cover a 15-year timespan, going from 2000 to 2015, with a yearly frequency. In Table 1, we report all the time series considered, along with the indication of the database from which we have obtained them and the group to which they pertain.

Table 1 – *List of variables employed in the DFM analysis (1/2).*

Number	Variable	Database	Unit of Measure	Group
1	Inter-regional net flows migration rate	OECD	Percentage	Demography
2	Population density	OECD	Ratio	Demography
3	Young migrants share	OECD	Units	Demography
4	Interregional migration	OECD	Units	Demography
5	New residents in the region from another region (same country)	OECD	Units	Demography
6	Old Population Group (65+)	OECD	Units	Demography
7	Interregional migration, young people (under 29 years old)	OECD	Units	Demography
8	Disposable Household Income	OECD	Euros	Economic Wealth
9	Primary Income Households	OECD	Euros	Economic Wealth
10	Regional GDP	OECD	Euros (Mln)	Economic Wealth
11	Regional Gross Value Added, total activities	OECD	Euros (Mln)	Economic Wealth
12	Rate of Early Leavers from Education and Training	OECD	Percentage	Education, social environment
13	Rate of Young People Not in Employment and not in any Education and Training	OECD	Percentage	Education, social environment
14	Share of Labour Force with Tertiary Education	OECD	Percentage	Education, social environment
15	Share of Labour Force with Secondary Education	OECD	Percentage	Education, social environment
16	Dependency Ratio, (% -15 plus 65+ over population 15-64)	OECD	Percentage	Education, social environment
17	PCT patent applications per million inhabitants	OECD	Units	ICT and innovation
18	R&D Total Personnel Rate	OECD	Percentage	ICT and innovation
19	Railway transport of freight	Eurostat	Tons	Transport
20	Air transport of freight	Eurostat	Tons	Transport
21	Number of persons employed	Eurostat	Units	Labour Market
22	Compensation of employees	Eurostat	Euros	Labour Market
23	Labour utilisation	OECD	Percentage	Labour Market
24	Share of employment in knowledge-intensive services	OECD	Percentage	Labour Market
25	Share of employment in high-technology manufacturing	OECD	Percentage	Labour Market
26	Population of firms	Eurostat	Units	Productive Structure

The table lists the variables included in the dynamic factor analysis, the database from which they were extracted, their unit of measure and what kind of "macro-dynamic" they describe

3. Results

Through the application of our Bayesian DFM model, we obtain a ranking of the statistical units under analysis, according to their performance in terms of location attractiveness for firms. Furthermore, and most importantly policy-wise, it allows for ranking the factors that determine such performance, understanding what the main drivers are that can make a territory suitable for new productive locations.

Table 2 – *Ranking of NUTS 2 regions according to their ability to attract firms.*

Rank	Region	Score (out of 50)
1	Lombardy	42.7
2	Veneto	41.4
3	Lazio	40.8
4	Piedmont	39.5
5	Autonomous Province of Trento	38.4
6	Tuscany	37.2
7	Emilia Romagna	37.1
8	Liguria	36.4
9	Autonomous region of Bolzano	36.3
10	Marche	32.1
11	Friuli Venezia Giulia	31.5
12	Puglia	29.2
13	Campania	29
14	Aosta Valley	27.4
15	Umbria	26.5
16	Abruzzo	23.3
17	Calabria	22.8
18	Sicily	20.1
19	Molise	18.6
20	Sardinia	18.5
21	Basilicata	17.1

The Table ranks the Italian NUTS 2 territories according to their ability to attract firms, as measured by our indicator, rescaled using a score of 50 as maximum value.

Starting from the ranking of the regional firms' attractiveness, we have rescaled the values of indicators obtained for each statistical unit on a 50 point basis. This was done in order to make them more comparable and to make the ranking more immediately apparent. We find, as expected and shown in table 2, that northern regions prevail as the top performers, with the notable exception of Lazio, the

capital region, whose high score is pushed by demographic and transport variables. Arguably, given the variables available and employed in such analysis, we do not measure the efficiency rate of such infrastructures or their functioning; we only address their capacity in terms of freight transit. At the bottom of the scale we mainly find southern regions, with Basilicata, Molise and Sardinia faring worst. For the first two regions, the drivers of the weak performance are attributable to poor demographic dynamics, a stagnant labour market and inadequate infrastructures. In the case of Sardinia, again labour market conditions play a key role, but the main determinant of its low ranking is the brain drain phenomenon - the migration of its high-skilled youth from the territory.

Moving on to the analysis of the factors that drive such a performance, we must clarify a methodological step: given that we estimate a DFM, we are able to observe the loadings associated to any variable employed for each year. Hence, we have built up their ranking by taking the loadings associated to the variables included in the analysis. Figure 1 reports the top 3 critical success factors and anchors to mediocrity for a given territory in terms of its attractiveness to firms. As anticipated above, a key role is played by infrastructures, labour market conditions and education. For what concerns the first, territories with active airports or railways for freight transport have a key competitive advantage in attracting firms to settle there, as interconnection with supply and outlet markets plays a fundamental role in the current globalized business environment, confirming the claims of Holl and Mariotti (2018). For what concerns the labour market conditions, our empirical framework yields that higher firm attractiveness is related to higher employment rates, witnessing that firms prefer to settle in areas featuring an active labour market, where the workforce is trained and holds distinctive skills, as emerges from the works of Morkuté and Koster (2018) and Suarez Serrato and Zidar (2016). Finally, education attainment resembles one of the most important drivers of firm migration, as it exerts a pulling force under two perspectives: on one hand, territories with a higher skilled labour force are the ones that are most suitable for firms to settle in, given the expertise and know-how they can readily find (cfr. Manjón-Antolín, and Arauzo-Carod, 2011, Pablo-Martì and Arauzo-Carod, 2018); on the other hand, people with high educational levels contribute to stimulating innovation, enhancing local competitiveness and, hence, attracting fresh streams of investments (see Morkuté and Koster, 2018).

Table 3 – *List of factors that drive/hinder regional attractiveness for firm location*

CRITICAL SUCCESS FACTORS	*ANCHORS TO MEDIOCRITY*
Railway transport of freight	Dependency Ratio, Demographic (% -15 plus 65+ over population 15-64)
Young migrants share (migrants 15 to 29 over total migrants)	Number of persons employed
Share of Labour Force with Tertiary Education (in % of labour force)	Rate of Young People Not in Employment and not in any Education and Training (in % of the total population aged 18 to 24)

The Table lists the 3 main critical success factors and anchors to mediocrity, as measured by the loadings related to the dynamic factor estimated.

Moving on to the analysis of the factors that most of all hinder the ability of territories to stimulate the settlement of new firms, the brain drain phenomenon plays a central role, as demonstrated by Sachs (2016). Indeed, regions in which such a dynamic is more patent also display a mediocre incoming-outgoing firm balance. This is what drives down, for example, southern regions' performance, in particular that of Sardinia and Calabria. Another push factor is the low education level, in particular the high incidence of the so called "NEET" (people not in education, employment or training). Again, this confirms the important role workforce skills play in the strategic decision process made by firms, as outlined by Mellander and Florida (2014), who stress the rising importance of worker skills in regional development. Indeed, in the midst of the fourth industrial revolution, the competitive challenge is played on the basis of innovation ability and process optimization, all features that require trained workers. Summarizing, the results yielded by the DFM analysis depict a clear scenario: labour market conditions, education level and infrastructure efficiency play key roles in determining the attractiveness of a territory for firms. Indeed, a skilled labour force is bound to be a valuable required asset for the firms, which, in turn, would want to exploit such an asset and to do so are incentivized to locate their plants where such a workforce is available. A well-functioning infrastructure is a fundamental item, since having easy access to supply and target markets constitutes a key competitive factor in a market that is increasingly more interconnected and globalized.

4. Conclusions

In a scenario where large firm relocations are shaping the social and economic structures of developed countries, though possibly harming the working middle-class, political formulas that are able to counter, or at least mitigate, consequences

are sorely needed. The present research aims at understanding what the push and pull factors are that underlie a firm's location choices at the NUTS 2 (regional) level in Italy, so as to provide policymakers with an indication of how to intervene in order to preserve and enhance territorial competitiveness. The empirical framework selected was chosen for two reasons: the possibility to include a large number of factors, not incurring in under specification issues and allowing for considering altogether the different features that describe the regional socio-economic fabric, and the willingness not to impose any theoretical a priori. On the downside, the choice to use regions as statistical units, due to their data availability, conditions our findings in some way, though their use still allows for gaining some relevant policy insights. Indeed, we find that a key role in regional firms' attractiveness is played by the presence of a high-skilled labour force and efficient infrastructures, while brain drain dynamics and low educational levels are bound to drive it down.

Overall, this work allows for depicting a thorough scenario of the regional competitiveness in attracting firm location, ranking the territorial units on the basis of their performance, while tracking down what the main contributors are of such a performance. For future research, it would be interesting to expand the analysis cross-sectionally, making it international, including NUTS 2 entities belonging to other countries, so as to assess whether by expanding the geographical scope the evidence obtained holds or changes. Alternatively, another interesting upgrade would come from the narrowing of the focus, shifting the analysis to a NUTS 3 or, even, municipal level. Furthermore, it would also be interesting to include new variables, as some relevant features, e.g. taxation, were not included in this analysis due to lack of available data.

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SUMMARY

Drivers of companies migration flows: an integrated analysis

The present work aims at building a new indicator that measures how much a territory attracts new firms. Past research has exploited mainly spatial models or qualitative analyses performed through surveys. We aim to apply a new framework, namely a Dynamic Factor Model (DFM) in order to achieve a twofold goal: rank the Italian NUTS 2 territories (regions) by their ability in attracting new firms and assessing which are the main factors that drive this phenomenon. The choice of such an empirical approach was selected also because we aim to proceed to such an assessment freeing our approach from any a priori theoretical imposition. Results highlight that key success factors for territorial competitiveness are the quality of the labour force and the efficiency of the infrastructures, while anchors to mediocrity are represented by high migration rates between young and skilled workers (brain drain dynamics) and stagnant labour markets.

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COMPOSITE INDICATORS AND SPATIAL CORRELATIONS OF ITALIAN MUNICIPALITIES' SOCIO-ECONOMIC MEASURES[1]

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1. Introduction

In recent years, the debate on the measurement of multidimensional phenomena has caused, within the worldwide scientific Community of developed countries, a renewed interest. It is common awareness that a number of socio-economic phenomena cannot be measured by a single descriptive indicator and that, instead, they should be represented with multiple dimensions. Phenomena such as development, progress, poverty, social inequality, well-being, quality of life, etc., require, to be measured, the "combination" of different dimensions, to be considered together as components of the phenomenon (Mazziotta and Pareto, 2013). This combination can be obtained by applying methodologies known as composite indicators (Salzman, 2003; Mazziotta and Pareto, 2011; Diamantopoulos et al., 2008). The publication, in September 2009 of the report by the Commission on the Measurement of Economic Performance and Social Progress (Stiglitz Commission), set up by the French President - Nicolas Sarkozy -, was crucial for developing several studies about "Beyond GDP" scenarios. The Commission's aim has been to identify the limits of GDP as an indicator of economic performance and societal progress, to consider what additional information might be required for the production of more relevant indicators of social progress, to assess the feasibility of alternative measurement tools, and to discuss how to present the statistical information in an appropriate way. In fact, for many years, GDP (Gross Domestic Product) has been an indisputable landmark for states all over the world, playing the key role in defining, implementing and evaluating the effects of government action. Recently, the international debate has questioned the supremacy of GDP, and initiatives have been launched which, through the involvement of a growing

[1] The paper is the result of the authors' work; in particular sections 2 and 3 are written by Antonella Bernardini, sections 1 and 6 are wrutten by Matteo Mazziotta and sections 4 and 5 are wtitten by Valeria Quondamstefano.

number of countries, aim to develop alternative ways of measuring well-being that assign the same value to its components, Economic, social and environmental.

In the Italian scenario, the first report on "Equitable and Sustainable Well-being" (BES) by the Committee composed by Istat (Italian Institute of Statistics) and CNEL (Italian Council for Economics and Labour) was published in March 2013. It consists in a dashboard of 134 individual indicators distributed in 12 domains. In the last the three BES reports, published in December 2015, 2016, 2017, composite indicators at regional level and over time were calculated for the 9 outcome domains, creating a unique precedent in the official statistics at international level. In recent days, the debate has become from a scientific to a policy scope: parliamentary and local administrators are affirming the necessity to link the Istat well-being indicators to interventions/actions in the socio-economic field, thus constructing an even stronger connection between official statistics and policy evaluation. In fact, the Italian Parliament has finally approved on 2016 July 28 the reform of the Budget Law, in which it is expected that the BES indicators, selected by an ad hoc Committee, are included in the Document of Economics and Finance (DEF). The new regulations also provide that by February 15th of each year Parliament receives by the Minister of Economy a report on the evolution of the BES indicators. A Committee for equitable and sustainable well-being indicators is established, chaired by the Minister of Economics and composed by the President of Istat, the Governor of the Bank of Italy and two experts coming from universities or research institutions (Mazziotta, 2017). In this context, the research on this issue assumes a strategic role both for Istat and for academic institutions. The project, from national, is getting local and already several local authorities, although they not have legislative obligations, are studying the well-being indicators of their territory (for example, the Municipality of Pesaro, the Municipality of Figline-Incisa, the Region Calabria and others). With these assumptions, it seems necessary to calculate well-being measures for all Italian municipalities so that administrators and citizens can dispose of them to understand and decide better policies. Since the current statistical surveys do not provide socio-economic indicators disaggregated at municipalities level (Census is the only source, every ten years), it is necessary to use administrative sources, hopefully, collected in informative systems. The paper aims to present an experiment conducted on the Italian municipalities where socio-economic indicators are calculated starting from administrative sources and big data; and then composite indicators are computed in order to have a unidimensional measure. The framework adopted is represented, therefore, by the conceptual and methodological one developed by Istat and CNEL for the BES project (Istat, 2015). The structure of the domains and the selection of indicators derived from the national BES. For each domain, indicators identified and defined by the scientific committee of the

BES are analysed; a search through the various sources of official data available was conducted in order to obtain the data necessary to calculate indicators at level of municipality.

2. Administrative Data Sources

Starting from 2021, the population census and the master sample on households will provide many indicators each year at the municipal level. Integration between direct surveys and administrative sources is the main route of modern statistics where the timeliness of the information must be associated with a very fine spatial detail. In view of the enhancement and integration of administrative sources, the experimentation uses dataset provided by the project ARCHIMEDE (Integrated Archive of Economic and Demographic Micro Data), that collects micro-data relative to the universe of individuals and households living in Italy. Thus, it is possible to calculate indicators relating to family types, income, employment status, job security, social problems, level of education and training and other. It is also possible to estimate, for each municipality, the municipal flows for study or work, and the average mobility times. Istat Project ARCHIMEDE aims at expanding Istat information by producing longitudinal paths (for example, social and economic) and cross-sectional collections of micro data to be made available to users and useful to social and economic research, to sectorial and territorial planning, and to public policy evaluation at national, regional and local levels. This objective has to be achieved through the exploitation of administrative database information contents integrated into Istat platform SIM (Integrated Micro data System). During the year 2013 three experiments were designed and conducted in relation to the themes "Resident population" (identification, classification and quantification of the population using the territory), "Precarious employment" (identification, classification and qualification of workers with precarious employment contracts) and "Household socio-economic conditions" (construction of an information structure on households to analyse various aspects of their socio-economic status). The purpose of the experimentation was to assess the real project potential on the one hand, and to propose and assess the feasibility of specific statistical products and systems for the dissemination of information outputs, on the other (Garofalo, 2014). Recently, several quality analysis of ARCHIMEDE data have been made. Obviously it is not possible to measure quality to communal detail as there are no benchmarks of comparison. However, starting with ARCHIMEDE, the socio-economic indicators are calculated at regional level and compared with those from direct surveys: the differences are very small and the reasons are known.

3. Individual Indicators

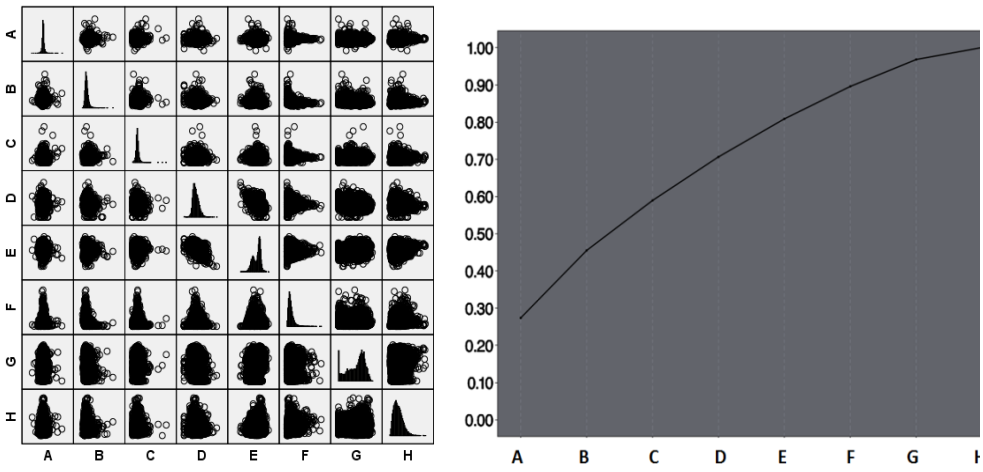
The use of data sources listed above allows calculating, at this step of the research, 8 individual indicators for all the Italian municipalities in the year 2015: in fact, as mentioned in the introduction, the starting matrix is composed by 7,998 rows and 8 columns. Using ARCHIMEDE, it is possible to construct many individual socio-economic indicators for several domains of well-being. In particular, in this paper, the focus is on seven well-being domains that represent the socio-economic condition of citizens at the municipal level: obviously this is an experimentation that, in the continuation of research, will be extended to all domains of well-being extracted from the administrative archives. Below, domains and individual indicators are presented. "Population and demographic aspects": total migration rate (A); index of dependence of the elderly (B). "Health": standardized mortality rate (C). "Education": Not (engaged) in Education, Employment or Training (NEET) (D). "Labour": regular employees (E). "Economic well-being": Income inequality Index (F). "Environment": separate collection of municipal waste (G). "Infrastructures and mobility": Index of attraction. (H) It seems necessary to point out that the individual indicators taken from administrative sources cannot be perfectly matched to those calculated by direct sample surveys since there are differences from a theoretical point of view. For example, the indicator regular employees is not employment rate because it is calculated as a ratio between people of 20 to 64 years old enrolled in a population register with a regular employment on the total number of people enrolled in the population register of 20-64 years old: of course, irregular workers are excluded from this rate, and it is known that the population registered (resident) is not the same population living habitually in the generic municipality. Therefore, these ratios are composed by a numerator and a denominator that are different, depending on whether the source is administrative or the classical sample survey on labor force. Since sample surveys fail to provide data to communal detail and therefore, at this particular historical moment, researchers are trying to experiment with the best way to integrate them with administrative sources, even if this means dealing with distortion more or less significant. Recent experiments on the municipalities of Basilicata and Emilia Romagna have been made and the results have confirmed the validity of the use of administrative sources for statistical use. The table with correlations of individual indicators selected for experimentation is presented below (see the appendix for the main characteristics on the construction of the indicators).

Table 1 – Correlations among individual indicators – 2015

Individual Indicators	A	B	C	D	E	F	G	H
A	1.000	0.053	0.052	-0.014	0.033	0.032	0.000	0.059
B	0.053	1.000	0.055	-0.025	-0.019	-0.321	-0.209	-0.153
C	0.052	0.055	1.000	0.064	-0.088	0.004	-0.088	-0.049
D	-0.014	-0.025	0.064	1.000	-0.719	0.084	-0.367	-0.195
E	0.033	-0.019	-0.088	-0.719	1.000	-0.195	0.384	0.297
F	0.032	-0.321	0.004	0.084	-0.195	1.000	-0.041	0.156
G	0.000	-0.209	-0.088	-0.367	0.384	-0.041	1.000	0.201
H	0.059	-0.153	-0.049	-0.195	0.297	0.156	0.201	1.000

It is interesting to note the level of correlations is very low and, for example, the individual indicator total migration rate is not correlated to the other indicators. Although for the measurement of the phenomenon a formative model is adopted and therefore the correlations between individual indicators are not of particular importance, it seems that the indicators are statistically very informative since these correlations are weak.

Figure 1 – *Scatter plot matrix of the individual indicators and scree plot of the components*



In the Figure 1, the scatter plot matrix shows graphically the correlations presented in Table 1, making even clearer the reciprocal influence among the

indicators; the scree plot, obtained from a PCA on the eight individual indicators selected, shows that the first two factors explain less then 50% of the variance, that is, the statistical information contained in the multidimensional construct.

4. Composite Indicator

In order to synthesize the individual indicators in a unique measure, a composite indicator is used and it is the official methodology adopted by Istat for BES project (and not only). The Adjusted Mazziotta-Pareto Index (AMPI) is a partially non-compensatory composite indicator based on a standardization of the individual indicators, at the reference time, that makes the indicators independent from the unit of measure (De Muro et al., 2011). Therefore, all the individual indicators are assigned equal weights and also absolute time comparisons are allowed (Mazziotta and Pareto, 2016). In fact, a re-scaling of the individual indicators in the range (70; 130) according to two 'goalposts' is proposed, i.e., a minimum and a maximum value which represent the possible range of each variable for all time periods and for all units. The steps for computing the Adjusted MPI (AMPI) are given below (Mazziotta and Pareto, 2016). Given the matrix $X=\{x_{ij}\}$ with n rows (units) and m columns (individual indicators), we calculate the normalized matrix $R=\{r_{ij}\}$ as follow:

$$r_{ij} = \frac{(x_{ij} - \mathrm{Min}_{x_j})}{(\mathrm{Max}_{x_j} - \mathrm{Min}_{x_j})} 60 + 70$$

where x_{ij} is the value of the indicator *j* for the unit *i* and Min_{x_j} and Max_{x_j} are the 'goalposts' for the indicator *j*. If the indicator *j* has negative polarity[2], the complement of the formula aforementioned with respect to 200 is computed. Denoting with M_{r_i} and S_{r_i}, respectively, the mean and the standard deviation of the normalized values of the unit *i*, the generalized form[3] of the adjusted MPI is given by:

$$\mathrm{AMPI}_i^{+/-} = \mathrm{M}_{r_i} \pm \mathrm{S}_{r_i} \mathrm{cv}_i$$

where $\mathrm{cv}_i = \mathrm{S}_{r_i} / \mathrm{M}_{r_i}$ is the coefficient of variation of the unit *i* and the sign ± depends on the kind of phenomenon to be measured. To facilitate interpretation of results, we suggest to choose the 'goalposts' so that 100 represents a reference

[2] The indicator's "polarity" is the sign of the relation between the indicator and the phenomenon to be measured (+ if the individual indicator represents a dimension considered positive and - if it represents a dimension considered negative).

[3] It is a generalized form since it includes 'two indices in one'.

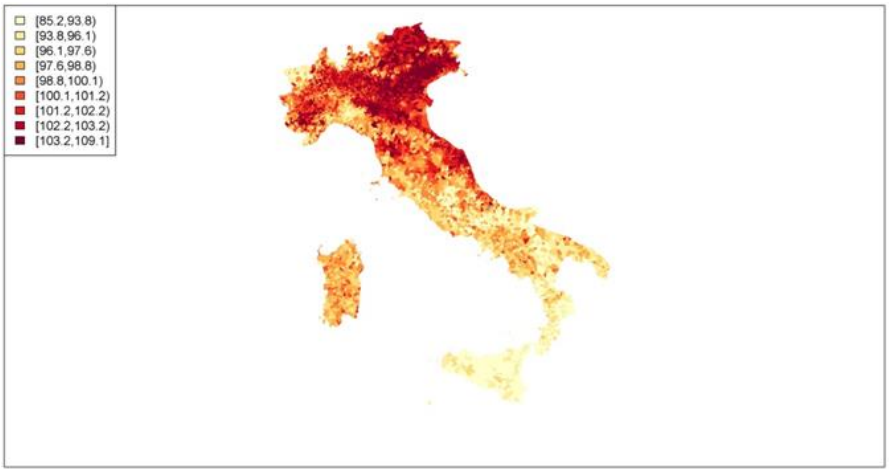
value (e.g., the average in a given year). A simple procedure for setting the 'goalposts' is the following. Let Min_{x_j} and Max_{x_j} be the overall minimum and maximum of the indicator *j* across all units and all years. Denoting with Ref_{x_j} the reference value for the indicator *j*, the 'goalposts' are defined as: $\mathrm{Ref}_{x_j} \pm \Delta$, where $\Delta = (\mathrm{Max}_{x_j} - \mathrm{Min}_{x_j})/2$[4]. The 'price' to pay for having final scores comparable over time is that individual indicators with different variability are aggregated. However, normalized indicators in an identical range have much more similar variability than original ones. For the mathematical properties of AMPI see Mazziotta and Pareto, 2016. In order to compare AMPI with a compensatory method, the arithmetic mean of the standardized values (using the same procedure of AMPI) is computed: in this way, the only differences between the methods are due to the function of synthesis (Mazziotta and Pareto, 2017).

5. Main Results

In this section some results of the application to real data are presented. The map represents with different colours (dark red is the best) the intensity of the phenomenon "Socio-economic condition" measured by the composite indicator for all Italian municipalities (Figure 2). The higher the value the better is the performance. The map is very informative (even too) in the sense that it seems difficult to understand what the behavior of the phenomenon for such a small detail is. However, the Figure 2 shows, as foreseeable, a net cut among the North, the Centre and the South of the country. The aim of the paper is also to show the possibility to analyse municipal detail so that the general map of Italy should be used as an aid to identify areas where the phenomenon has particular characteristics, for example a weaker yellow in a northern municipality or a stronger red in a southern municipality. In order to measure the relationship between neighboring municipalities for understanding their mutual influences, a spatial correlation is computed by Moran Index. It is multi-directional and multi-dimensional, and it is useful for finding patterns in complicated data sets. It is similar to correlation coefficients, it has a value from -1 to 1.

[4] Note that the normalized values will fall approximately in the range (70; 130).

Figure 2 – Socio-economic condition computed by AMPI – 2015

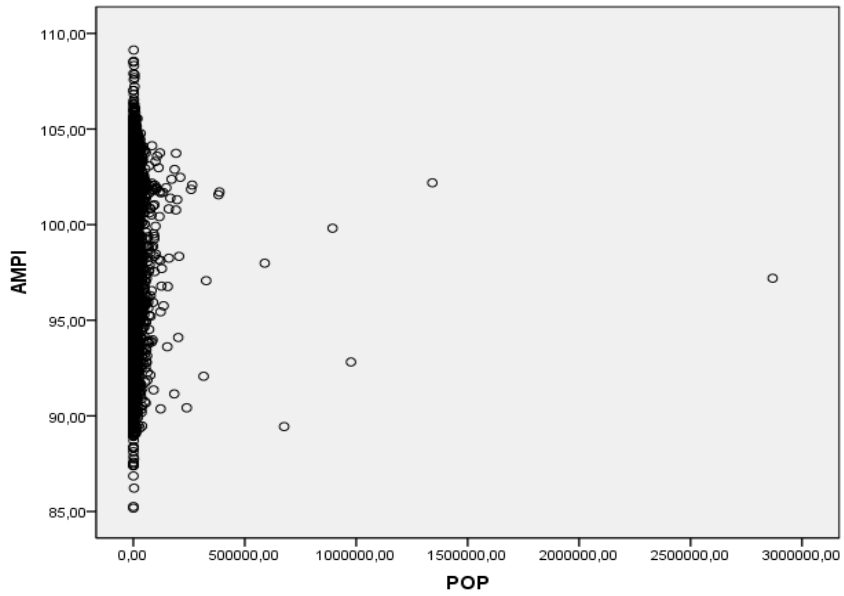


However, while other coefficients measure perfect correlation to no correlation, Moran's is slightly different (due to the more complex, spatial calculations): -1 is perfect clustering of dissimilar values (you can also think of this as perfect dispersion); 0 is no autocorrelation (perfect randomness.); +1 indicates perfect clustering of similar values (it's the opposite of dispersion). The Moran Index of socio-economic conditions of Italian municipalities is equal to 0.93. This value, very high, shows that in Italy a municipality surrounded by other municipalities that present high socio-economic conditions influences the condition of the municipality itself, and vice versa. So that, a municipality bordering other disadvantaged municipalities is negatively influenced. All this is also shown by Figure 1, in which the concentration of the most developed areas is easily identifiable in particular parts of the country, as well as that of the less developed areas. The composite indicator analysis for all municipalities must be a starting point for both micro-depth studies, but also for macro studies, such as measuring the correlation with other variables/indicators available at this territorial level.

The idea is to correlate the composite indicator of socio-economic condition with the population size of the municipality (Fig.3): the result is surprising since there is full uncorrelation ($\rho = -0.029$). This means that there is no factor related to the size of the municipality that can determine the socio-economic condition, and vice versa: these two informative contributions do not affect each other. And this is certainly a strength point of the composite index that can explain a multidimensional phenomenon that is independent from an important variable, especially in Italy, as the size of the municipality. However, the theme should

certainly deserve a deepening by trying to do the analysis again with more aggregate territorial areas (regions or macro-regions).

Figure 3 – *Scatter plot between AMPI and Population size*



6. Conclusions and Next Steps

The publication of the last three reports on Equitable and Sustainable Well-being (BES) by Istat is a central experience of study and socio-economic analysis for the entire international scientific community: composite indicators are calculated at regional level and over time for each of the nine outcome domains by creating a unique precedent in the official statistics at international level. Probably this very stimulating innovation has attracted the interest of policy makers at national and local level; hence several reflections were made not only in scientific journals but mostly on traditional media. The discussion is centered both on purely definitional aspects about the well-being of citizens and on methodological issues, more specifically the use of a set of individual indicators (dashboard) or on the application of composite indicators, because the scientific community is in agreement for supporting the multidimensionality of the phenomenon in a view "Beyond GDP" (Maggino, 2014). All this is even more relevant since the

performance of well-being indicators have entered, by law, within the national budget and therefore public accounts (the reform of the budget law was approved by the parliament on July 28, 2016). In this context, it seems important to provide high-quality statistics for the smallest territorial detail. Where traditional surveys cannot be of help because of too small sample size, then it is necessary to use administrative sources and/or big data. The research proposed in this paper is based on the selection of domains from the BES (the total is twelve) that represent the socio-economic conditions of the citizens. From each domain, individual indicators are extracted so that, based on a formative model (Diamantopoulos, 2008; Mazziotta and Pareto, 2017), they could well represent the multidimensional phenomenon. The eight socio-economic individual indicators are available at level of Italian municipality (7,998) from an integrated system of administrative sources (collected in ARCHIMEDE). Composite indicators, obtained by AMPI, are calculated in order to measure the socio-economic condition of the 7,998 municipalities, so that for each of them a single measure is provided (to make multidimensional reality one-dimensional). This "exercise of democracy" has a double objective: in fact, these values can be very useful for the evaluation of the intervention's policies by local administrators and for the assessment of the administrators themselves by the citizens (OECD, 2008). This means that one of the most important phases of the research is the best practice for publishing these results so that everyone can have easy access in order to better understand the socio-economic context and decide independently through data recognized as impartial by the Community. The experimentation on the data of eight individual indicators seems to have achieved satisfactory results both methodologically and theoretically. Preliminary data analysis shows that the correlations among the indicators have a correct polarity and that some indicators are almost orthogonal to each other and therefore very statistically informative: so, the goodness of the choice of indicators is also confirmed by an objective approach (a formative model is adopted, therefore, theoretically, correlations should not be relevant to the selection of the indicators). The composite index calculated on all Italian municipalities draws a well-known geography of social and economic conditions. In fact, the peninsula seems to be divided into three parts with the conditions getting worse going south. The North-east seems to be better than the North-west and the Center-north better than the Center. The composite indicator and demographic amplitude are basically uncorrelated and this means that there is no link between the socio-economic condition of the municipality and its population size: rather there is a relation with localization in the Italian territory. However, the type of data available would require the analysis to be made for details of particular smaller areas as Local Labor Systems (LLS), neighborhoods of large cities or special sub-populations such as people with disabilities, homeless, people detained

in prison, etc. In fact, the main objective is to use this data for the evaluation of public policies and to provide an objective set of available social and economic measures to thematic experts and ordinary citizens in order to assess the performance of actions on the territory. The research in this scientific field is making great strides. Nevertheless, it seems necessary that the use of administrative sources and big data (such as mobile data, scanner data and others) is associated with sample surveys that can, for example, collect types of subjective variables. This new scenario could change radically, on the one hand, the production of official statistics, and other, the analyses of socio-economic phenomena. In this regard, the aim of this research is to calculate composite indicators for all outcome domains of well-being for all Italian municipalities.

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SUMMARY

Composite indicators and spatial correlations for socio-economic measures of Italian municipalities

The measurement of socio-economic phenomena is based on multidimensionality and the recent literature, including official statistics, is demonstrating this assumption.

Phenomena such as well-being, poverty, quality of life, sustainability require a set of individual indicators to be well interpreted. The treatment of multidimensionality can be of factorial type, if we are in a reflexive approach, and it can be based on particular techniques of composite indicators if we are in a formative approach. The recent debate on the use of composite indicators for economic planning, both national and local, is delineating the need to have individual indicators at a level as much as possible disaggregated. In this context, it seems essential the use of integrated administrative sources that can provide socio-economic indicators at very detailed territorial level. The paper shows one of the first applications of experimental statistics on municipal data from administrative sources published by Istat in 2018. In particular, the analysis is based on the selection of domains and individual indicators of well-being at the municipal level; on these socio-economic measures composite indicators are calculated in order to obtain a value for each of the approximately 8000 Italian municipalities. Since the authors are aware that such a detailed territorial survey can be very difficult to read due to the great variability present on the Italian territory, a spatial correlation based on Moran Index is proposed. The results, on the one hand, seem to confirm a reality of division into three parts of the Italian territory known in the literature; on the other hand, they seem to show that well-being is not dependent on the demographic dimension of the municipalities but on the geographical location.

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A PROPOSAL FOR A MICRO-TERRITORIAL WELL-BEING INDEX: THE WIT

Massimiliano Serati, Fausto Pacicco

1. Introduction

Until the end of the twentieth century in the economic and political debates the growth of pure economic indicators such as GDP was seen as the main sign of an increase in people's well-being. Today it is clear that although these are linked to economic growth, they do not automatically imply an increase in overall quality of life, due to an ineffective coincidence between production and well-being. This was known to economists since the introduction of the System of National Accounts, as Kuznets itself warned about the possible inadequateness of sheer economic figures (such as GDP, GNP, etc) to depict complex phenomena, such as the well-being of populations (Kuznets, 1937). Notwithstanding that policy makers focused their actions on maximising the growth of these indicators, neglecting that such measures do not take into account a wide range of different phenomena affecting living conditions (Afsa *et al.*, 2008). Thus, a branch of Economics started to explore alternative ways for measuring and analysing well-being. Nordhaus and Tobin (1972) developed two indexes, the Measure of Economic Welfare (MEW) and the Sustainable MEW (SMEW), based on adjustments made to the Net National Product (NNP): such indexes were not sensibly different from the NNP, but the authors still suggested the need of further researches. Similar attempts were the Japan SMEW and the Zolotas' Economic Aspect of Welfare Index, always based on SNA's adjustments (Redclift, 2006). This issue regained the policy makers attention during the 90's, thanks to the Human Development Index from the United Nation Development Program (Ul Haq, 1995), which underlines the importance of non-monetary measures in the well-being measurement, and other indexes such as the Index of Sustainable Welfare (ISEW, Daly et al., 1994) and the Genuine Progress Indicator (GPI, Talberth, 2007) introduced the importance of sustainability in such efforts. Another notable and recent work is the one from "The Commission on the Measurement of Economic Performance and Social Progress", led by the economists Joseph Stiglitz, Amartya Sen and Jean Paul Fitoussi, requested by the then France President Nicholas Sarkozy (Stiglitz *et al.*, 2008).

Such complex phenomenon can be tackled by adequately large sets of indicators, developed to specifically address thematic issues; however, these are not efficient as they can be affected by multicollinearity and require a certain level of statistical knowledge to be used. For the sake of exposition such batches are synthesized in 2nd level indicator, known as Objective Well Being (OWB)[1] indexes (Giannetti *et al.*, 2015). This more efficient approach is flourishing all over the world, developed by national statistic offices, research groups, individuals and supra-governmental agencies (Noll, 2002). However, Breuer and Brueser (2013) pointed out the lack of well-being estimates on micro-territorial level (e.g. municipalities): while it may sound foolish to measure well-being on an extremely fine geographical scale, this is the ideal starting point to overcome administrative boundaries and clustering municipalities to identify a set of medium sized areas homogeneous in terms of well-being, allowing more efficient policies of local development. Furthermore, it seems inherently wrong to allocate urban development funds from decisions based on information inferred from higher geographical levels.

In this paper we overcome these limits proposing a multi-step procedure aimed at building a composite index of objective well-being on a micro-geographical level for a time-frame spanning from 2001 to 2015; we give this index the name WIT, acronym of Well-being Index for Towns, developing and testing a framework on the set of all municipalities in the Italian region Lombardy. The implementation of the set of indicators feeding WIT benefits from the richness of *100% Lombardia* (Rappelli *et al.*, 2017), a large repository of indicators providing a full picture of all the economic, social, demographic, infrastructural (and so on) features of the Lombard municipalities. After having drawn from *100% Lombardia* the original components of WIT, we build a Bayesian Dynamic Factor Model (B-DFM), that allows for optimal components aggregation scheme, without any loss of information regarding the pattern of dynamic correlations among the composite index and its components. As a further by-product our multi step approach outlines a new geography of the well-being in Lombardy, based on clustering the cities into 11 "WIT-homogeneous" areas. Finally, to both validate our composite index and check for interactions between well-being and socio-economic variables, we include the WIT into a Panel Vector Autoregressive model with an exogenous variable (P-FAVARX) and simulate the impact of a shock affecting well-being on a set of variables concerning competitiveness and attractiveness of territories. Our results

[1] There is also a branch of economic/psychological literature that measures the well-being from a subjective point of view, asking "directly" about life satisfaction: this field is known as Subjective Well-Being (SWB). While this field is undoubtedly a valuable contribution to the academic debate on the well-being, it has not been considered in this paper; for a detailed review of the SWB contributions, see for example Diener *et al.* (1999).

show that clusters of cities do follow different well-being evolutions over time, due to policies initiatives, and that also a higher well-being increases the overall attractiveness of places.

2. Data description and methodology

2.1. Data source

The dataset used in this paper is *100% Lombardia*, a statistic platform developed by LIUC Università Carlo Cattaneo and Èupolis Lombardia. It has 161 indicators (129 are 1st level indicators, built from raw data, and the rest are 2nd level indicators, built from aggregation of the previous ones), encompassing many thematic areas that can be grouped in: i) Economic and business conditions, ii) Socio-demographic aspects, iii) Infrastructures and iv) Territories and attractiveness. Data is available for 1531 cities in Lombardy, for the 2001-2015 timespan, and the platform is freely available on the Regione Lombardia's website (http://www.sisel.regione.lom-bardia.it/statlomblight/tema/100-lombardia). It has been recognized as a valuable tool for local policy making from ISTAT (2015) and from the European Commission (Rappelli *et al.*, 2017), after being used to identify 3 areas in Lombardy as admissible in the list of areas worthy of development funds from the Italian Ministry of Economy and Finance.

2.2. A threefold methodology

To depict a complete view of well-being, 52 indicators[2] are chosen from the *100% Lombardia* platform, following the main literature findings. These indicators map similar projects, such as the Italian ISTAT's BES project, and the micro-level impacts of development agendas, such as the UN's 2030 Agenda for Sustainable development.

To find similarities among the cities of Lombardy, we conduct a cluster analysis (CLA) on the 52 indicators[3], with longitude and latitude to account for geographical proximities only in this first phase. Between the different cluster techniques available (see for example Spath, 1980), we choose a hierarchical clustering method, to allow for a data-driven configuration of each clusters, with the Ward's method on Euclidean squared distance, which minimize the within-cluster error sum of squares, given by:

[2] Due to the sake of exposition, a full list of the indicators used is available in the appendix.
[3] All the indicators are standardized to avoid issues related to the use of different scales, as suggested by Nardo *et al.* (2005)

$$SS_c = \sum_{c=1}^{C}(\sum_{o=1}^{O}\sum_{v=1}^{V}(x_{o,v} - \bar{x}_{o,v}) \quad (1)$$

Where $c = 1,2,\dots,C$ is the number of clusters, $o = 1,2,\dots,O$ is the number of objects and $v = 1,2,\dots,V$ is the number of variables.

After the CLA, a Bayesian Dynamic Factor Model (B-DFM) is used to summarize the indicators in a single factor to describe the local well-being[4]. These models are extensions of standard factor ones, allowing to extract and condense information in a number of factors potentially lower than the starting number of variables, omitting only a residual portion of information; following the Del Negro and Schorfheide (2011) approach, a DFM can be:

$$Y_{i,t} = \alpha_i + \lambda_{i,t} f_t + \varepsilon_{i,t},\ t = 1,\dots T\ \ i = 1,\dots,N \quad (2)$$

Where f_t is a $F \times 1$ vector of factors, i.e. the common information between all the observable variables, and $\varepsilon_{i,t}$ is an independent and idiosyncratic process specific to each subject, a condition needed to identify the model; α_i is a constant and $\lambda_{i,t}$ is a $1 \times F$ vector of loadings that relates each $Y_{i,t}$ to the factor for the same t. According to Lopes and West (2004), other assumptions are needed to avoid overparameterization, so we adopted their "diffuse though proper priors" (p. 46), and we used the straightforward Gibbs Sampler developed by Koop and Korobilis (2009).

The final phase of our analysis is a Panel Vector Autoregressive model with an exogenous variable[5] (P-VARX) which allows to exploit both time-series and cross-section specific of our data and testing how the B-DFM affects other social, economic and demographic variables. With $n = 1,\dots,N$ cross-sectional units and $t = 1,\dots,T$ periods, a P-VARX with an exogenous variable of order q has the following generic form (Holtz-Eakin *et al.*, 1988):

$$Y_{n,t} = Y_{n,t-1}\phi_1 + Y_{n,t-2}\phi_2 + \cdots + Y_{n,t-q}\phi_q + X_{n,t}\psi_{n,t} + u_n + \varepsilon_{n,t} \quad (3)$$

Where $Y_{n,t}$ represents a $1 \times V$ vector of variables, $\varepsilon_{n,t}$ the $i.i.d. \sim N(0, \Sigma)$, the u_n term which contains the panel fixed effects and $X_{n,t}$ an $1 \times L$ vector of L exogenous variables (if needed); the $\phi_n$and $\psi_{n,t}$ matrices contain the parameters to

[4] Data have been extended forward and/or backward, in order to provide a unique time range. Such operations have been made with an AR(1) model, on flipped-back series in the case of a backward extension. However, when there was only 1 year available, data has been simply repeated for whole timespan, to account at least cross-sectional differences/similarities.

[5] We encountered some numerical inconsistencies in the 2011 data, w.r.t. the rest of the series, due to different collection method (the ISTAT census); thus, we decided to include an exogenous dummy, set equal to 1 only in the 2011 quarters.

be estimated (endogenous and exogenous, respectively). As OLS estimates of P-VARX can be inconsistent even with large t (Judson and Owen, 1999), we chose a Generalized Method of Moments estimation, which benefit from the adoption of lagged dependant variable as instruments (Abrigo and Love, 2016).

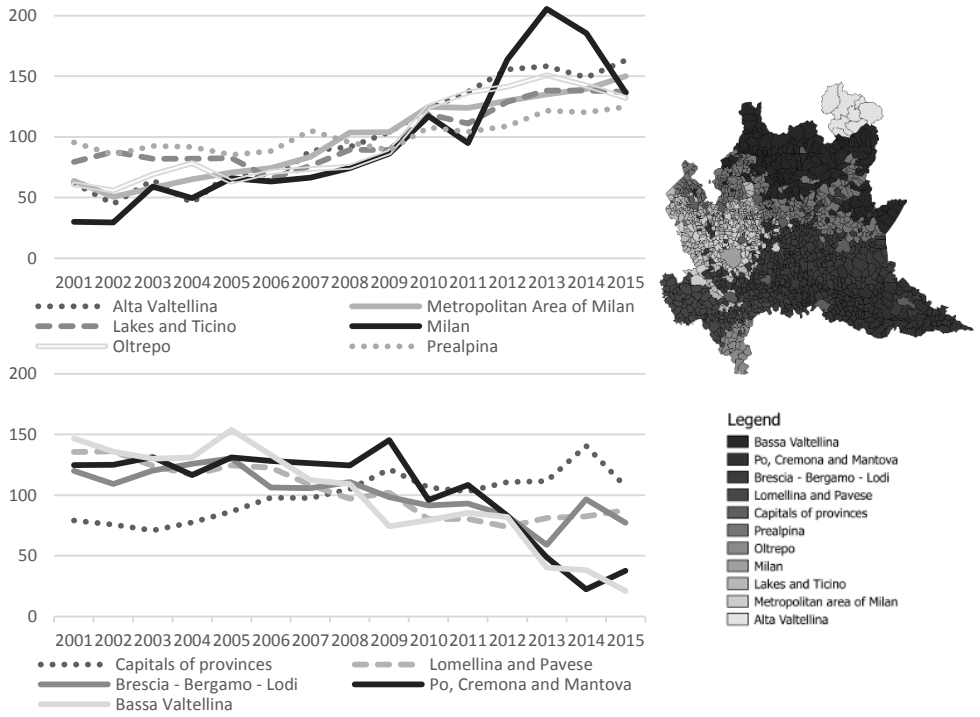
3. Results

We identify 11 clusters, a number that allows to easily compare our results with the 12 provinces in Lombardy; data has been linearly interpolated (to have quarterly series from 2001 to 2015 for all the 11 clusters) and only 1 B-DFM is extracted, in order to synthesize as much as possible the well-being naming it WIT.

3.1. The WIT from 2001 to 2015

Figures 1 and 2 shows the WIT values for the 11 clusters, from 2001 to 2015, with an average starting value of 100, while Figure 3 plots the cluster on a geographical map of Lombardia, with the name for each of them chosen on their position.

Figures 1, 2 and 3- *The WIT for the 11 clusters from 2001 to 2015 (Figure 1 and 2, left) and the cluster map with companion legend of clusters names (Figure 3, right)*



The upper graph shows the 6 clusters that performed well, showing positive trends in the WIT while it is the opposite for the ones in the lower graph.

The "Alta Valtellina" cluster shows a steadily increase in the WIT, starting from the 9th position in the 2001 and ending in the first position in the 2015. This territory is bestowed with a renowned mountainous territory, an important attraction for tourists and skiers: thus, it seems plausible that compared to other territories this area benefited of better natural endowment, supporting economic development. Indeed, if we compare it to the cluster of "Bassa Valtellina", we can see that this ranked last, probably due to territorial differences and infrastructure for winter tourists. Milan and its metropolitan area show also a sharp increase in their well-being value, also due to the business investments in these areas, culminated with the universal exposition EXPO 2015 in Milan: these investments heighten the WIT of both areas, but the city of Milan shows a decrease in the last 2 years, probably due to overcrowding phenomena, not mirrored in the nearby

metropolitan area. The rest of the clusters in the upper graph show similar upward trends: it is possible to notice how the cluster "Lakes and Ticino" performs better than "OltrePo" and "Prealpina" clusters, probably due to a highest concentration of firms and the absence of overcrowding phenomena. Furthermore, the cluster of "OltrePo" increases the overall well-being overtime, thanks to the many initiatives of wine and food tourism and then being able to follow a path of overall growth, reflected in the WIT.

In the lower graph, the cluster of Capitals of provinces seems to have followed an upward trend until around 2008, but then stopped to gain in terms of well-being: the social, demographic and economic endowment of such cities seems to have not been able to counter the great global crisis, thus stopping the previous growth path. The rest of the clusters reported were not able to counter the decreasing trend of overall well-being: weaker infrastructure, less economic initiatives and less social initiatives mined the development of their well-being.

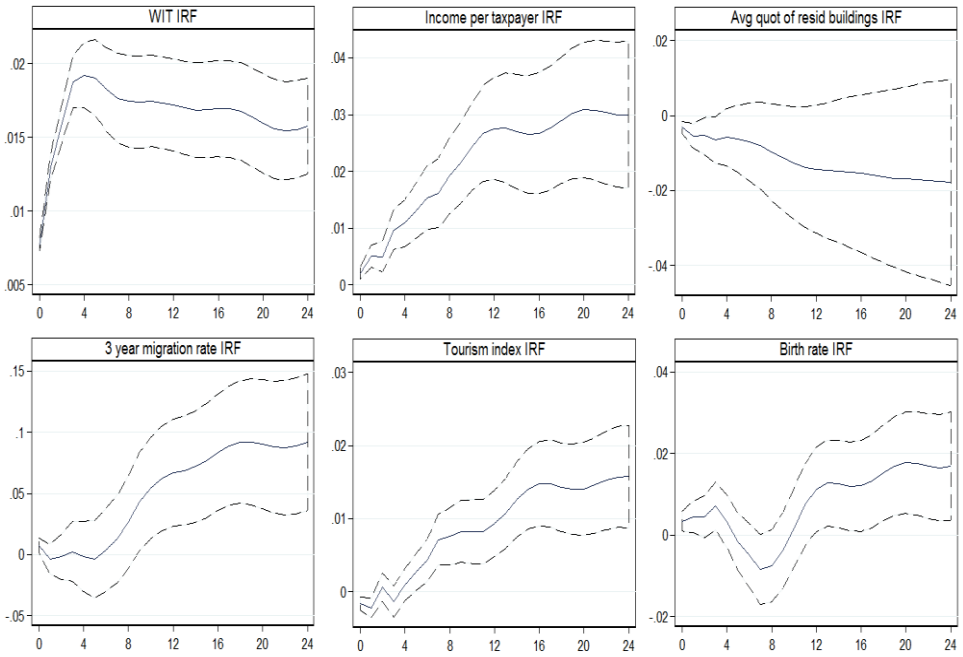
3.2. P-FAVARX results

The P-FAVARX introduced above is estimated on 1st differenced data to avoid non-stationarity issues, and 4 lags have been chosen according to the MAIC; also, the 18^{th} lag of variables is instrumented (as required in the GMM estimation): the Sargan-Hansen test of overidentifying restriction do not reject the null hypothesis, thus allowing us to have a correctly specified model[6].

To see how the WIT interacts with other variables, we study the cumulated impulse response functions (IRFs) of a 1 S.D. shock to the WIT for 24 quarters, reported in the Figure 4. The causality order of the P-FAVARX(4) is WIT, Income per taxpayer, Average quotation of residential buildings, 3 year migration rate, Tourism Index and Birth rate; such order relies on the relative "speed" of how one indicator varies if compared to the rest, but it is robust to pairwise permutation in the causality chain. Confidence intervals have been estimated through 2500 Monte Carlo simulations using a 95% threshold.

[6] As before, due to space limitations tables with these tests are available in appendix

Figure 4 – *PVARX's IRFs to 1 s.d. positive shock to the WIT*



The first graph in the upper row shows how the WIT behaves on a shock on itself, showing the resilience of the well-being as its cumulated IRF is strictly positive and different from zero for all the 24 quarters: an "investment" on the WIT increase is a sustained one, leading to an enduring well-being increase. Similarly, the income per taxpayer IRF is positive, reinforcing the idea that an increase in well-being bestows its positive effects also on monetary means. While the average quotation of residential buildings is negative for the first 3 quarters, it then becomes not significantly different from zero: indeed, such effect can be positive for the attractiveness of locations, since an increased WIT does not heighten the residential buildings quotation.

The first graph of the lower row represents the IRF of the 3-year migration rate: it becomes significantly different from zero and positive after 9 quarters, indicating that the WIT attractiveness is somewhat "slow", probably due to an "assessment of well-being": if individuals notice an increase in the overall well-being, they start to assess it, through temporary visits. Indeed, the Tourism Index becomes positive after 5 quarters, a sign of the increased attractiveness. Thus, after an "evaluation" of the increased WIT and its resilience, proved by the WIT's IRF, people start to relocate permanently themselves in such places, causing an increase in the 3-year

migration rate. Finally, the birth rate IRF (the 3rd graph of the lower row) also confirms the phenomenon observed in the previous IRFs: after an initial period of non-significant response, the birth rate becomes positive after 12 quarters, indicating that people slowly assess the well-being increase in an initial period, and then decide to permanently move to the new location and having children.

4. Conclusion

The measurement of well-being and the key drivers behind it are still under investigation, even though the debate is still ongoing from the ’70: however, it is clear that the approximation offered by sheer economic measures (e.g. GDP, NNP) is inadequate, due to the multi-faceted nature of the well-being phenomenon. More proper alternatives have been developed all over the world, both as sets of indicators and synthetic indicators of well-being; however, these are not calculated on micro-territorial levels (except for bigger cities).

In this paper, thanks to micro-territorial data from *100% Lombardia* and a threefold methodology we developed a well-being index for all the cities in Lombardy, from 2001 and 2015, calling it WIT (Well-being Index for Towns). By including the WIT a Panel VARX model, we validates the WIT analysing its relation with other socio-economic variables, finding support for our theoretical framework: an increase in the WIT is resilient and it increases the income per taxpayer, the 3-year migration rate, the tourism attractiveness and the birth rate, while not having effects over the average quotation of residential buildings. This paper both calls for a refinement in the approach for measuring objective well-being, as well as for a micro-territorial level of analysis, which can be used for refining and making more efficient development initiatives for territories.

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Appendix

Appendix Table 1 - List of the indicators used to build the B-DFM

3 years migratory rate	Incidence of families with potential discomfort
3 years net rate of population	Incid. of young people out of labour market/training
Air pollution degree	Income concentration
Anthropization index	Index of population structural sustainability
Car park density	Index of population youthfulness
Car park eco-sustainability	Industrial risk index
Commercial density	Intensity of hydrogeological instability
Commuters attraction index	Labour market absorption capacity
Completeness of the scholastic offer	Index of infrastructures load
Cultural resources endowment	Localization advantage coefficient
Degree of congestion of road network	Modernity of housing heritage
Degree of internal infrastructures	Per capita income
Degree of physical infrastructure	Per person production of waste
Density of social/family services offered	Political participation
Density offer of health services	Population exposed to landslides
Digital territorial endowment	Production density
Employment in social/family sectors	Rate of soil degradation
Foreign population incidence	Real estate wealth
Health sector occupation	Road network risk index
Incidence of active population	Seismic risk index
Incidence of differentiated waste	Social and civil participation activities
Incidence of employment in high-medium jobs	Territor. concentr. of environment. valued emergences
Incidence of environmental valued emergencies areas	Density of school infrastructures
Unemployment rate	Territorial impact of Natura 2000
Incidence of low-income tax payers	Transformation rate of anthropized areas
Incidence of residents with university degree	Incid. of households with potential econ. hardship

Appendix Table 2 - *Descriptive statistics of the P-FAVARX model*

Lag order selection criteria						
Lag	CD	J	J-pvalue	MBIC	MAIC	MQIC
1	1.00	362.95	0.29	1734.13	335.05	888.73
2	0.99	348.83	0.16	1598.03	299.17	813.18
3	0.99	340.53	0.05	1456.11	257.47	731.82
4	1.00	288.81	0.13	1291.51	237.19	654.43
5	1.00	162.77	1.00	1201.23	291.23	651.36

Eigenvalue stability condition					
Real	Imag.	Mod.	Real	Imag.	Mod.
0.91	0.28	0.95	-0.52	-0.48	0.71
0.91	-0.28	0.95	-0.52	0.48	0.71
0.68	0.63	0.93	-0.07	0.64	0.64
0.68	-0.63	0.93	-0.07	-0.64	0.64
0.51	-0.74	0.90	0.37	0.52	0.64
0.51	0.74	0.90	0.37	-0.52	0.64
0.84	-0.07	0.85	-0.38	-0.41	0.56
0.84	0.07	0.85	-0.38	0.41	0.56
0.64	-0.47	0.79	-0.52	0.04	0.52
0.64	0.47	0.79	-0.52	-0.04	0.52
0.66	0.25	0.71	-0.26	0.39	0.47
0.66	-0.25	0.71	-0.26	-0.39	0.47

Overidentifying restriction test
Hansen's J chi2(411)
466.88
P-value
0.029

SUMMARY

A proposal for a micro-territorial well-being index: the WIT

The well-being measurement and its key-drivers are still "opaque" issues, despite the importance in both academic and public debates (Stiglitz *et al.*, 2009). The sheer approximation of this complex phenomenon with economic measures (such as GDP, NNP) do not allows for a full characterisation, thus requiring vast sets of indicators, to address each theme and/or synthetic index. In this paper starting from the *100% Lombardia* statistical platform, we develop a synthetic measure of well-being (named WIT), for 11 clusters of cities in Lombardy, testing them with other socio-economic variables. We find that socio-economic variables react as expected in response to shocks, thus confirming the appropriateness of our approach.

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MULTIDIMENSIONAL POVERTY MEASUREMENT: DEPENDENCE BETWEEN WELL-BEING DIMENSIONS USING COPULA FUNCTION

Kateryna Tkach, Chiara Gigliarano

1. Introduction

Well-being is suggested to be multidimensional and to consist of both monetary and non-monetary attributes. Recent studies have investigated the aspect of this multidimensionality from various perspectives, i.e. from the discussion of key dimensions to be considered to the extension of univariate poverty measures into multidimensional setting (Bourguignon and Chakravarty, 2003; Alkire and Foster, 2011). Although current approaches to well-being indices have mostly focused on disjoint performance of individuals in several dimensions (e.g. the Human Development Index, OECD Better Life Index), recent literature has pointed out the relevance of the dependence between dimensions (Decancq and Lugo, 2012; Decancq, 2014).

This paper focuses on the dependence between three dimensions of well-being, namely income, education and health, using cross-sectional data from the EU-SILC referred to the year 2015. We employ copula function (Nelsen, 2006) and copula-based measures of concordance, namely Kendall's and Spearman's rank correlation coefficients, to measure the dependence between specified dimensions.

The rest of the paper is structured as follows: Section 2 provides a brief overview about copula and copula-based dependence measures, Section 3 shows data and the results of parametric and nonparametric estimation of Spearman's rho and Kendall's tau coefficients. Section 4 describes copula-based weighting scheme in multidimensional poverty measure and, finally, Section 5 concludes.

2. Methodology

Let us introduce necessary notations here. Let $F(x)$ and $G(y)$ denote marginal distributions of random variables X and Y and $H(x,y) = P[X \leq x, Y \leq y]$ their joint distribution function. Finally, let $C(u,v)$ with $(u,v) \in [0,1]^2$ denote bivariate

copula function and $C(\boldsymbol{u})$ with $\boldsymbol{u} = (u_1, \dots, u_d) \in [0,1]^d$ be d-dimensional copula. Copula is a function that separates the dependence behavior from the marginal distributions. The main definition about the copula function is the following.

If $\mathrm{H}(x, y)$ is a joint distribution function with uniform margins F and G, then there exists a 2-dimensional copula C: $[0,1]^2 \longrightarrow [0,1]$ such that (Nelsen, 2006)

$$\mathrm{H}(x, y) = \mathrm{C}\big(F(x), G(y)\big) \tag{1}$$

Parametric copula families can be classified into elliptical and Archimedean ones[1]. Gaussian and t-copula belong to the elliptical group, while Frank and Gumbel copulas come from the Archimedean family. Each copula allows modelling various dependence structures (e.g. symmetric dependence in tails, strong dependence in upper tail etc.).

There exist several approaches to copula inference that can be grouped into parametric and semi-parametric ones. Classical fully-parametric method is the maximum likelihood estimator (MLE). The MLE is the preferred first option due to its optimality properties (Kojadinovic and Yan, 2010). However, previous statement is true if the marginal distributions are specified correctly. As argued by Kim et al. (2007), fully parametric estimators (including the MLE) of copula parameter might be biased due to the misspecification of margins.

An alternative approach belongs to semi-parametric group and is known as pseudo-maximum-likelihood (PML) estimator discussed by Genest et al. (1995). Following the PML approach, marginal distributions are estimated non-parametrically by their empirical cumulative distribution functions. On the second step, the copula dependence parameter is estimated by maximizing the pseudo-loglikelihood function

$$logL(\theta) = \sum log\left(c_\theta\big(\hat{U}, \hat{V}\big|\theta\big)\right) \tag{2}$$

where c_θ is a copula density function, θ is a copula parameter to be estimated, $\hat{U}$ and $\hat{V}$ are rank-transformed pseudo-observations on the unit interval $[0,1]$. In case ties occur, the average rank is assigned to each element.

Let us now turn to copula-based dependence measures. Bivariate Kendall's τ and Spearman's ρ coefficients written in terms of copula are given by

[1] Elliptical copulas are derived from elliptical distributions characterized by radial symmetry. Gaussian copula and t-copula are typical examples of this group. Archimedean copulas form another parametric family of copulas that are based on the generator function (Nelsen, 2006). While elliptical copula functions model symmetric behavior in tails of distribution, Archimedean copulas, instead, allow a wider range of dependence structures.

$$\tau_K = 4\int_0^1\int_0^1 C(u,v)dC(u,v) - 1 \tag{3}$$

$$\rho_S = 12\int_0^1\int_0^1 uv\, dC(u,v) - 3 \tag{4}$$

Six copula families together with the corresponding methods to get Kendall's τ and Spearman's ρ coefficients are defined in Table 1. Both Kendall's and Spearman's coefficients are normalized on the interval $[-1;1]$, where these extremes correspond to countermonotonic and comonotonic random variables respectively, while zero stays for independent ones.

Table 1–*Kendall's τ, Spearman's ρ coefficients and their definitions in terms of copula*

Copula	$C(u,v,\theta)$	τ_K	ρ_S
Gaussian	$\Phi\rho\left(\Phi^{-1}(u),\Phi^{-1}(v)\right)$	$\frac{2}{\pi}\arcsin\theta$	$\frac{6}{\pi}\arcsin\left(\frac{\theta}{2}\right)$
t-copula	$T_{\rho z}\left(T_z^{-1}(u),T_z^{-1}(v)\right)$	$\frac{2}{\pi}\arcsin\theta$	$\frac{6}{\pi}\arcsin\left(\frac{\theta}{2}\right)$
Frank[1]	$\frac{1}{\theta}ln\left(1+\frac{\left(e^{\theta u}-1\right)\left(e^{\theta v}-1\right)}{e^{\theta}-1}\right)$	$1-\frac{4}{\theta}\left(1-D_1(\theta)\right)$	$1-\frac{12}{\theta}\left(D_2(-\theta)-D_1(-\theta)\right)$

[1]*Both correlation coefficients based on Frank copula rely on Debye function given by* $\mathrm{D_k}(\theta)=\frac{\mathrm{k}}{\theta^{\mathrm{t}}}\int_0^{\theta}\frac{\mathrm{t}^{\mathrm{k}}}{\mathrm{e}^{\mathrm{t}}-1}\mathrm{dt}$, *where* $\mathrm{k}=1,2$ *(see Genest (1987) and Nelsen (2006) for details)*

Sources: Frees and Valdez (1998); Huard et al. (2006); Nikoloulopoulos and Karlis (2008); Joe (2015)

Possible d-dimensional generalizations of both rank correlation measures were discussed by Schmid and Schmidt (2007) and Blumentritt and Schmid (2014) among others. Multidimensional extensions of Spearman's ρ_S and Kendall's τ_K coefficients are defined as follows

$$\rho_S = \frac{d+1}{2^d-(d+1)}\cdot\left\{2^d\int_{[0,1]^d} C(\boldsymbol{u})d\boldsymbol{u} - 1\right\} \tag{5}$$

$$\tau_K = \frac{1}{2^{d-1}-1}\cdot\left\{2^d\int_{[0,1]} C(\boldsymbol{u})dC(\boldsymbol{u}) - 1\right\} \tag{6}$$

with $\boldsymbol{u}=(u_1,\dots,u_d)\in[0,1]^d$. When $d=2$, equations (5) and (6) coincide with bivariate versions of coefficients given in (3) and (4). For further details and other multivariate extensions see Schmid and Schmidt (2007) and Genest et al. (2011). In the d-dimensional case upper bound and independence benchmark are maintained. However, both coefficients do not approach -1 as lower bound. This feature is explained by the fact that perfect negative dependence is not possible if the number

of dimensions $d > 2$. Therefore, both multivariate coefficients have the following bounds (Nelsen, 1996): *(i)* $\frac{2^d-(d+1)!}{d!\{2^d-(d+1)\}} \leq \rho_S \leq 1$; and *(ii)* $\frac{-1}{2^{d-1}-1} \leq \tau_K \leq 1$.

Multivariate extensions from equations (5) and (6) are estimated nonparametrically by the empirical copula for $d \geq 2$ (Schmid and Schmidt, 2007). The interpretation of multivariate versions of Spearman's ρ and Kendall's τ coefficients in the well-being context is the following. Both measures compare the specified society with a reference society. For Spearman's coefficient a society with independent dimensions serves as the reference point, while Kendall's measure considers a society with the same level of dependence as a reference.

3. Results of copula estimation

3.1. Data description

This analysis aims to understand the degree of dependence between the dimensions of well-being and reflect it into multidimensional poverty measure by using an appropriate weighting scheme.

In this study, we focus on the following dimensions of well-being: income, education and health. Dimensions chosen in this study are the ones considered in the Human Development Index and in the Multidimensional Poverty Index. We will investigate the correlation between each pair of dimensions.

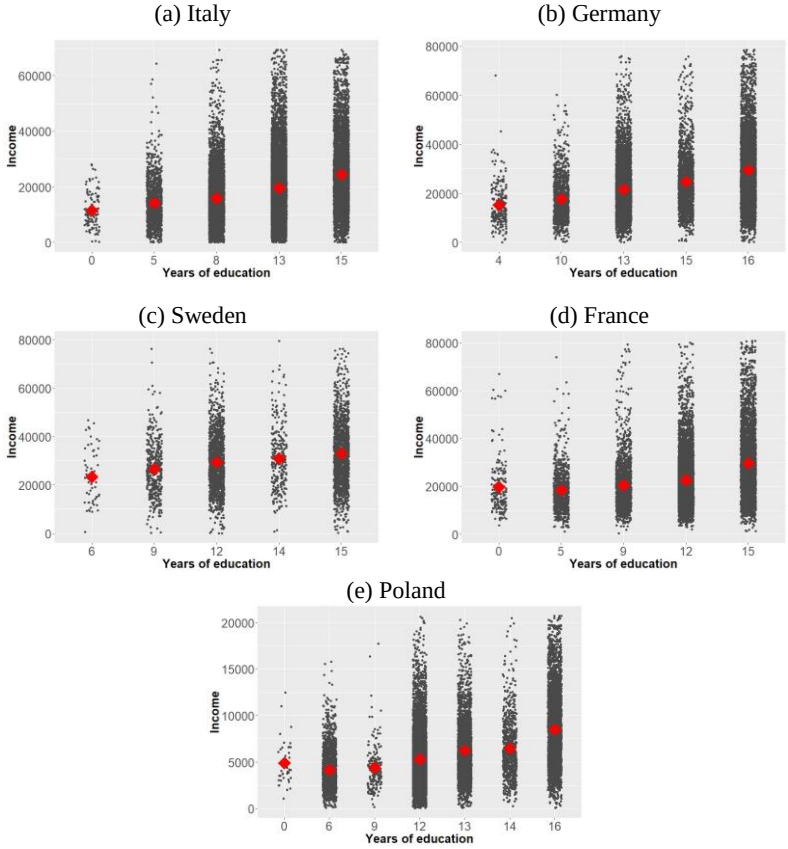
To measure the dependence between dimensions, we use the data of the EU-SILC referred to the year 2015. In our study we consider the following countries of the EU: Italy, Germany, Sweden, France and Poland abbreviated as IT, DE, SE, FR and PL respectively. Our sample includes individuals aged from 16 to 65. We consider every individual aged 16 years or more as an adult, following the approach of the EU-SILC. We exclude young adults, who are currently involved into educational programs since they have not achieved their highest educational level yet.

As indicator for income dimension we apply equivalised disposable income constructed by OECD-modified scale. Individuals with the top 1% of income are excluded from the sample. As indicator for education we choose the number of years of education. However, since the latter variable is not present in the survey, we construct it in the following way: we assign to each individual the number of years required in the specific country to complete the highest educational level attained (Meschi and Scervini, 2014). The health indicator is represented by the self-assessed general health status.

3.2. Pairwise dependence

The first pair of well-being dimensions we focus on is income-education. The highest education attainment considered in our sample is the tertiary one corresponding to 15-16 years of total duration of schooling. The concordance between income and years of education across countries is shown in Figure 1. For each country its population is divided into groups according to the total years of schooling and the equivalised disposable income is plotted for each group. As Figure 1 highlights, the mean of income increases when years of education increase. The steepest increase of income is observed for the post-secondary tertiary and non-tertiary education in all countries, except Sweden, where the association between the variables is the lowest.

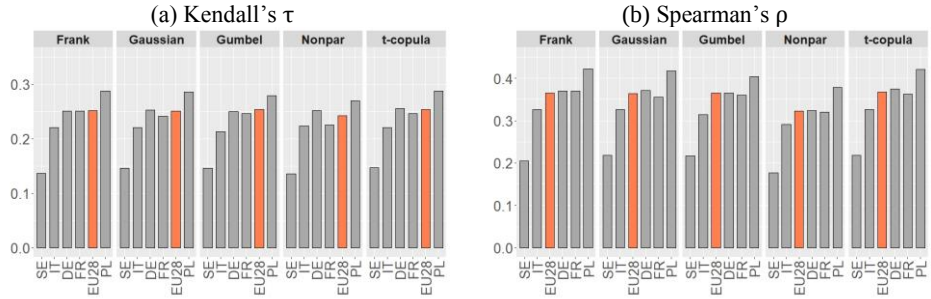
Figure 1 – *Scatterplot of income versus years of education*



Note: red diamonds represent mean of income in each educational group

In the next step of the analysis, we consider bivariate versions of Kendall's and Spearman's correlation coefficients discussed earlier. Figure 2 reports estimates of both measures grouped according to the underlying copula family. The average dependence across 28 countries of the European Union (red bar in the figure) serves as a benchmark.

Figure 2 – *Copula-based correlation coefficients for income and education dimensions*

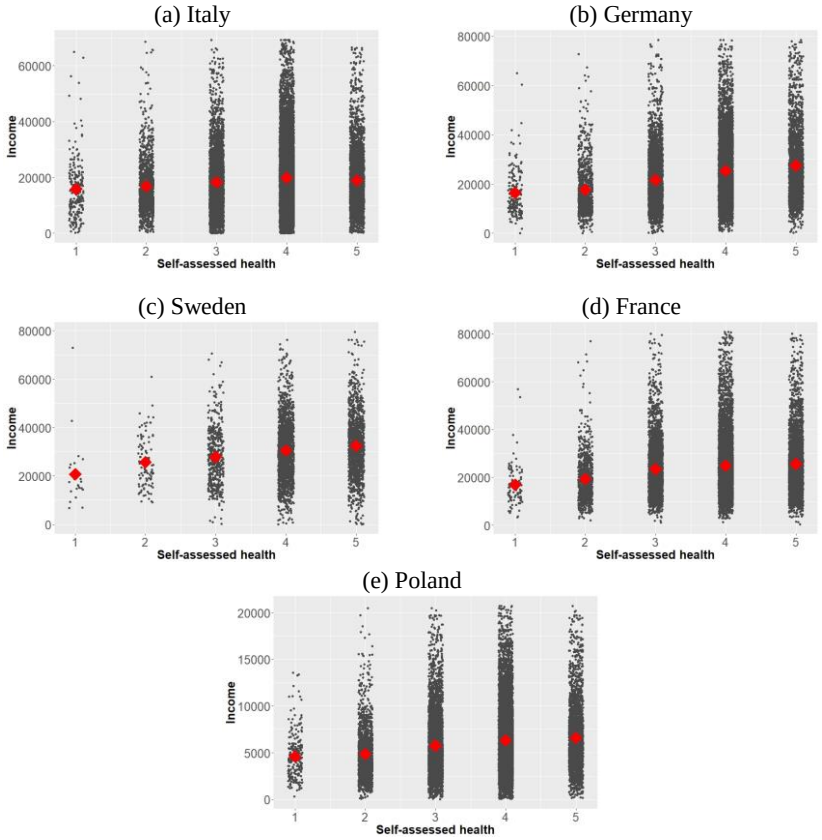


The highest level of dependence between income and education is observed in Poland, which also outranks the EU average dependence for both parametric and nonparametric estimation, while Sweden has the bottom position in the ranking. Both results are robust against the choice of the copula, suggesting that selection of the copula family does not affect the top and bottom positions in the ranking, while for intermediate positions fluctuations might occur. In particular, Germany and France exchange their positions in ranking due to the change of underlying copula.

We now consider income and health as the next pair of dimensions. The scatterplot displayed in Figure 3 illustrates the concordance between equivalised disposable income and self-assessed health. In Italy the association is minimal, while in Germany and Sweden it is more pronounced. Overall, the income mean increases less dramatically with the improvement of health status than with the increase of years of education.

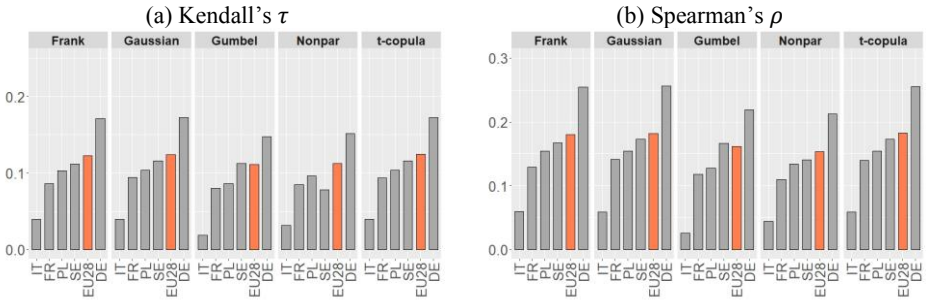
The ranking of countries according to the level of dependence between income and health status is shown in Figure 4 This pairwise dependence is generally lower than the one between income and education for all countries. In Germany, individuals who are better-off in terms of income also report better health status. In Italy, instead, the correlation between ranks in income and health dimensions is the lowest among the countries considered, indicating the weakest dependence between these two well-being domains.

Figure 3 - *Scatterplot of income versus health status*



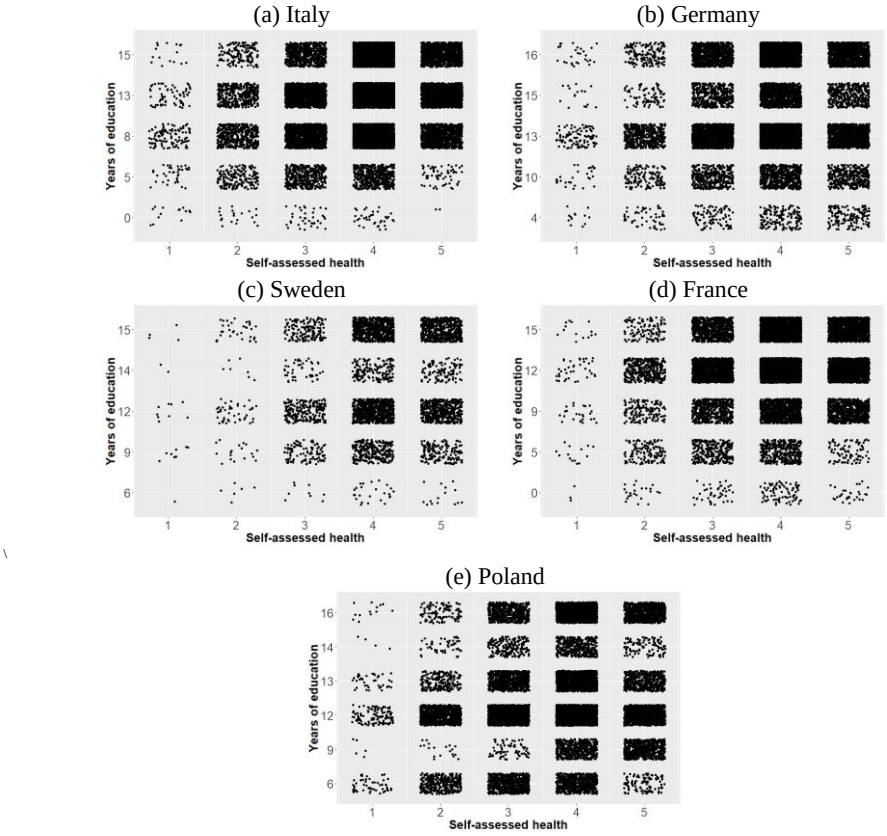
Note: red diamonds represent mean of income for each health status

Figure 4 – *Copula-based correlation coefficients for income and health dimensions*



The last bivariate analysis that we consider here is between education and health. The relationship between the two dimensions is shown in Figure 5. The subjective health status is plotted over years of schooling confirming that the variables are concordant. The majority of observations are concentrated in the right upper corner of the plot, demonstrating a positive association between the dimensions in Poland, Italy, France and Germany.

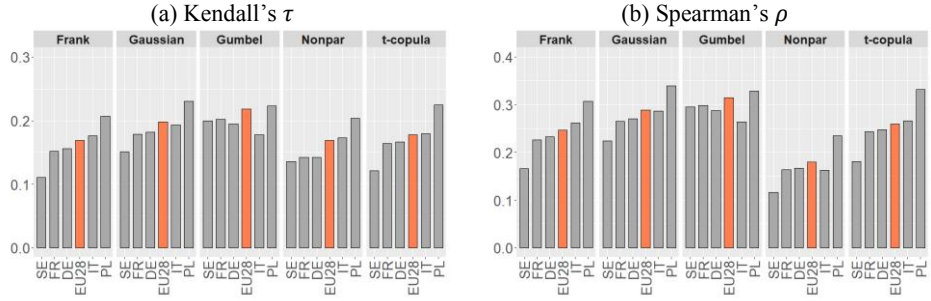
Figure 5 – *Scatterplot of education versus health status*



Estimates of copula-based dependence measures, reported in Figure 6, confirm the results discussed previously. Poland clearly outperforms rest of the countries in terms of dependence between education and health. The underlying copula does not cause a downward shift of Poland from its top position. Italy has the second position in ranking, although the latter is sensitive to the change of copula function. Similarly, France and Germany may exchange their positions in the ranking due to

the change in estimation procedure. Finally, for Sweden the estimates of correlation coefficients are the lowest in 4 out of 5 cases.

Figure 6 – *Copula-based correlation coefficients for education and health dimensions*



4. Copula-based weights in multidimensional poverty measurement

We have just shown that the performance of individuals in well-being dimensions correlates. We hence propose here to include in the multidimensional poverty measurement a weighting scheme that captures this correlation by using copula-based dependence measure. Before proceeding with it, we are introducing some notations. The size of the population is represented by n and the number of well-being dimensions is represented by d. The achievements matrix X with dimensions n × d summarizes distribution of attributes within the population. The typical element of X, x_{ij}, represents an achievement of individual i in well-being dimension j. Every row of matrix X shows achievements of individual i across all dimensions, while every column corresponds to distribution of dimension j across total population. The vector of dimension-specific thresholds is $z = (z_1, z_2, z_3, \cdots, z_d) \in Z$, where Z is a set of all possible real valued d-dimensional vectors z. Let $w = (w_1, w_2, \cdots, w_d)$ be a vector of weights and $\sum_{j=1}^{d} w_j = 1$, where $w_j > 0$ is a weight assigned to dimension j. An individual i is said to be deprived in dimension j if $x_{ij} < z_j$. Otherwise, individual is referred to as non-deprived (if $x_{ij} \geq z_j$). Finally, $P(X; z)$ is a multidimensional poverty measure. Let g_{ij}^{α} be a matrix of deprivations defined as follows:

$$g_{ij}^{\alpha} = \left[Max\left(\frac{z_j - x_{ij}}{z_j}, 0 \right) \right]^{\alpha} \tag{7}$$

with $\alpha \geq 0$ being a parameter of poverty aversion. If $\alpha = 0$, g_{ij}^{0} becomes a $0-1$ matrix of deprivations, for $\alpha = 1$ it is a matrix of poverty gaps and, finally, for $\alpha = 2$ it becomes a matrix of squared gaps. Following the counting approach introduced by Alkire and Foster (2011) with $\alpha = 0$, an individual is identified as multidimensionally poor if the total number of deprivations experienced by this individual is higher than the inter-dimensional cut-off k, with $1 \leq k \leq d$. Finally, the poverty measure with copula-based weights is computed as follows:

$$P(X,z) = \frac{1}{n}\sum_{i=1}^{n}\sum_{j=1}^{d} w_j g_{ij}^{\alpha}(k) \tag{8}$$

where matrix $g_{ij}^{\alpha}(k)$ summarizes deprivations of individuals using cut-offs for each dimension and identifies multidimensionally poor with inter-dimensional cut-off k. Here we propose copula-based weights for $\mathrm{d} = 3$ be computed as follows:

$$w_1 = \frac{\rho_{12}^{\theta_{12}} + \rho_{13}^{\theta_{13}}}{2\left(\rho_{12}^{\theta_{12}} + \rho_{13}^{\theta_{13}} + \rho_{23}^{\theta_{23}}\right)} \tag{9}$$

where ρ_{12}, ρ_{13} and ρ_{23} are copula-based correlation coefficients between two well-being dimensions and $\theta_{12}, \theta_{13}, \theta_{23} \geq 1$ are positive parameters that model the elasticity of substitution between respective dimensions of well-being. The higher the value of the elasticity parameter, the lower the level of substitution. When it reaches its minimum value (e.g. $\theta_{12} = 1$), the two dimensions are considered as complementary. Weights for dimensions 2 and 3 can be computed analogously. Dimensional weights constructed in this way belong to a data-driven group (Decancq and Lugo, 2013). Data-driven approach to weights does not imply a normative judgment about a trade-off between dimensions. Instead, the dimensions are weighted according to the distribution of individual performances in a society.

5. Concluding remarks

In this paper we have measured the dependence between well-being dimensions using copula-based dependence measures. This methodology has been applied to a selection of European countries using EU-SILC data for the year 2015. Results suggest that estimated correlation coefficients differ from the independence benchmark for the most pairwise comparisons and copula families employed. The highest dependence is observed between educational and income dimensions. We have then proposed to use copula-based weights in multidimensional poverty measures to make them sensitive to the distribution of individual ranks across

dimensions. This approach allows discriminating societies according to the level of dimensional correlation. Information on the correlation of deprivations enables more efficient allocation of resources by poverty-reducing policy.

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SUMMARY

Multidimensional poverty measurement: dependence between well-being dimensions using copula function

In this paper one of the challenges of multidimensional poverty measurement is addressed, i.e. the dependence between well-being dimensions. To measure this dependence, copula-based correlation coefficients are employed. This methodology is applied to EU-SILC data for the year 2015. The results of estimation suggest that individual performances in different dimensions correlate, but its magnitude varies across countries. The highest dependence is observed between educational and income dimensions.

The results of the pairwise estimation of correlation coefficients are then used for developing a weighting scheme in the multidimensional poverty index. This approach allows, in particular, to incorporate this inter-dimensional dependence into a multidimensional poverty measure.

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SUSTAINABLE DEVELOPMENT AND NATIONAL DIFFERENCES: AN EUROPEAN CROSS-NATIONAL ANALYSIS OF ECONOMIC SUSTAINABILITY

Leonardo Salvatore Alaimo

1. Introduction

In literature, the term sustainable development is widespread, but it has no unified definition. As shown by R. B. Gibson (2010), there are many definitions of this term currently in circulation, often divergent to each others. The importance of sustainability for economic growth was just underlined in 1972 by the Club of Rome: *if the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years* (Meadows et al. 1972, 23). This analysis was based on the recognition of the serious social and environmental consequences of a development idea based exclusively on growth and technological progress and on the importance of taking into account the scarcity of resources.

The term sustainable development was first introduced in 1987 by the Brundtland Commission and its report *Our Common Future* (WCED, 1987). *Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs* (WCED 1987, 41). This may be considered the first classical definition of sustainable development, emphasizing its intergenerational aspect. There has been a transformation of the meaning of sustainability, no longer focused only on scarcity of resources and the importance of their conservation (such as in *Limits to Growth*), but also on the satisfaction of the actual and future generations' needs.

The need to use the resources available to meet the needs of current generations and to keep them in order to meet the needs of future generations is one of the main characteristics distinguishing sustainable development from traditional one. However, the Brundtland's definition does not explain how to reach this goal. In literature, the dominant model proposed to achieve this goal is to conceive development as a multidimensional concept taking into account economic, social and environmental aspects. Nowadays, *the definition focuses on this holistic*

approach linking economic development, social inclusion and environmental sustainability (Sachs 2015, 6). Thus, sustainable development can be considered a three-way holistic framework, involving three complex systems - economic, social and environmental - interacting each others.

Since the release of Brundtland Commission's report, the concept of sustainable development was criticized[1]. Furthermore, in literature there is no consensus about the three-way framework. *One of the main obstacles to developing a common conceptual framework incorporating social, economic and ecological problems is the lack of genuine consensus among experts in each discipline as to how ecological, economic and social systems relate to one another* (Elliott 2012, 40). In other words, the debate focuses on the role that each component must have and on their mutual relations[2]. Despite the criticism, the tripartite model remains dominant and hegemonic in literature and it is the basis of the indicators' system proposed by the United Nations. For this reason, in this paper we analyze sustainable development by making this perspective.

Governments must define appropriate policies and actions for achieving sustainable development and the individuation of a set of goals is undoubtedly useful for doing this. The so-called *Agenda 2030*, adopted at the UN Sustainable Development Summit in September 2015, released the SDGs framework of 17 goals and 169 targets across social, economic and environmental areas of sustainable development, defined according to the principles of the *Rio+20 Summit*. At the same time, it is also essential to identify a global framework of indicators, functional to know and monitor the situation of each country with respect to each goal and target. *Quality, accessible, timely and reliable disaggregated data will be needed to help with the measurement of progress and to ensure that no one is left behind. Such data is key to decision making* (United Nations Division for Sustainable Development 2015, 12). The global indicator

[1] Some scholars reject the idea of sustainable development. S. Latouche, for instance, is very critical of this concept, defining it a mystification. *The term is so broad that it can be applied to anything and everything* (Latouche and Macey 2009, 10). According to Latouche, sustainable development is an oxymoron, since the only development we know is that which arose from the industrial revolution: an economic war among men and against nature.

[2] R. K. Turner, D. Pearce and I. Bateman (1993) suggest that the various approaches and definitions differ from each other because they are linked to two opposite perspectives, respectively labelled as *strong* and *weak* sustainability. The first one emphasizes environmental protection and it rejects the anthropocentric vision of the three-way framework, according to which environment is instrumental and subjected to human needs, putting them to the center of sustainable development. Environment cannot be considered as a dimension of sustainable development; it is the necessary condition for any kind of human activity, including the development. At the opposite, the second one focuses on free markets and claims that the sustainability notion is too vague to be helpful. Thus, nature is considered only instrumental to satisfy human needs. This perspective is based on a different understanding of the role and importance of the economic dimension, in terms of both development and growth. Creating well-being now and in the future is only achievable through increasing the value of total capital.

framework, adopted by the UN General Assembly on 6 July 2017, includes 232 indicators.

In this paper we will focus on the European countries. As highlighted in the monitoring report published by Eurostat in 2017, SDGs have long been at the heart of European policy and are integrated into key projects, sectoral policies and initiatives. Our goal is to analyze the level of achievement of SDGs in European countries, focusing in particular on the goals that belong to the economic dimension of sustainable development:

- Goal 8 - Decent Work and Economic Growth
- Goal 9 - Industry, Innovation, Infrastructure
- Goal 10 - Reduce inequalities
- Goal 12 - Sustainable Consumption and Production

We want to highlight the characteristics of the various countries with respect to each goal analysed, also comparing them to the EU situation, and to construct a synthetic index of *economic sutainability* taking into account these four goals. In particular, we will focus on the Italian situation and compare it with the situation in other EU countries.

2. Data and methods

The aim of this article is to define a synthetic index, which allows us to compare different countries regarding their level of economic sustainability. In doing this, we follow the hierarchical design, requiring the definition of different components (Maggino, 2017:90-91):

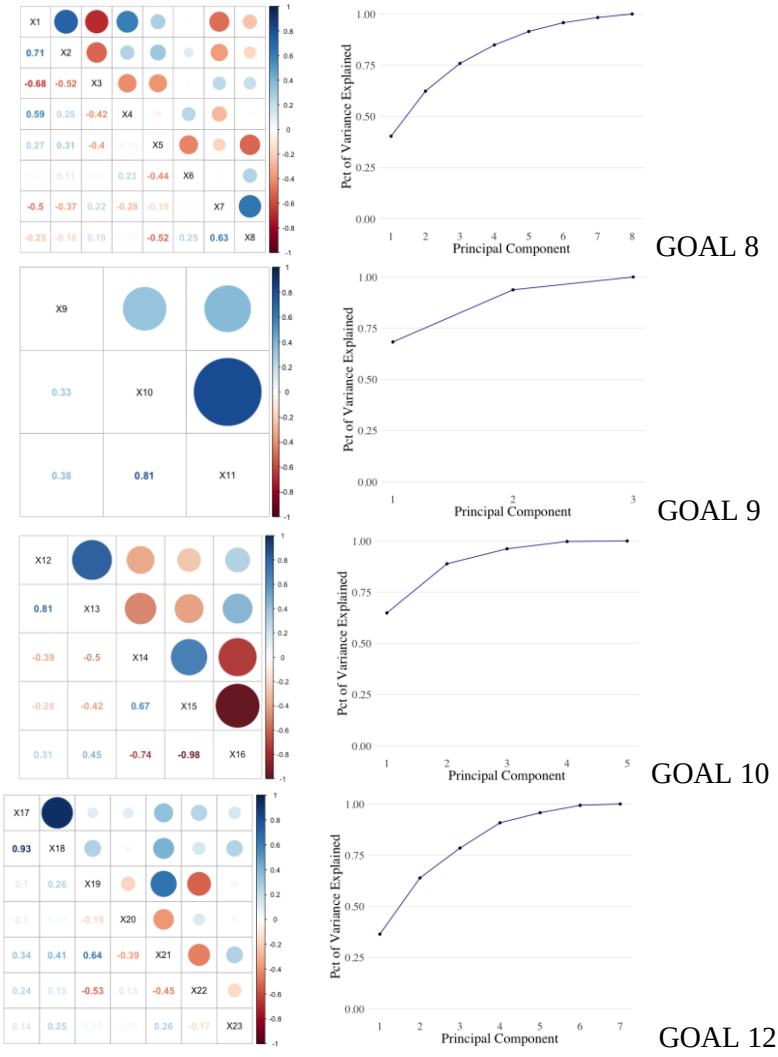
1. the phenomenon, its domains and its general aspects;
2. the variables and their (possible) domains, which represent each aspects, allowing the phenomenon to be specified;
3. the basic indicators, representing what is actually measured in order to investigate each variable and its domains.

We assumed that our model of measurement is formative, since indicators are considered as causing the phenomenon, then changes in indicators determine changes in the value and the meaning of the latent variable.

The data source is the Eurostat data-warehouse[3] and we considered the *Sustainable Development Indicators dataset* updated to May 2018. We used a set of 23 basic indicators all in time series from 2010 to 2016. Table A1 shows the indicators used, their definition and the goal to which they belong.

[3] http://ec.europa.eu/eurostat/data/database

Figure 1 – *Corrplots and scree plots: Goal 8; Goal 9; Goal 10; Goal 12.*



The corrplots report the ID of the indicators: please see table A1 for their names and descriptions.

We followed the *composite indicators approach* to build our synthetic index of economic sustainability. In particular, we first synthesized an index for each goal considered, and then we constructed the synthetic measure of economic sustainability, taking into account the indices obtained for the four goals. From the operational point of view, the construction of a composite index is a step-by-step

process: after the definition of the phenomenon and the selection of basic indicators, the following phases are the normalization of the individual indicators and the aggregation of the normalized indicators (Mazziotta and Pareto, 2017).

Before constructing our composite indices, we performed an exploratory analysis of the basic indicators chosen for each goal. In Figure 1, we report the *corrplots*, representing correlations among the basic indicators, and the *scree plots*, obtaining performing a principal components analysis (PCA) for each goal; at the same time, the PCA has a purely descriptive purpose, since the basic indicators were selected by Eurostat on the basis of a reasoned choice. The exploratory analysis provided results that supported the methodological choices. The analysis of the *scree plots* shows that the first two components explain more than 60% of variance in all goals; so, most of the indicators are correlated and represent similar aspects of the phenomenon considered. Therefore, this leads us to the conclusion that we can consider only one latent variable for the four goals and, then, we can construct a single composite index for each of them.

For the synthesis of the basic indicators, we used the Adjusted Mazziotta-Pareto Index (AMPI), which is a partially non-compensatory composite indicator based on a Min-Max standardization and a re-scaling of the basic indicators in a range (70; 130), according to two goalposts, representing a minimum and a maximum value of each variable for all units and time periods (Mazziotta, Pareto, 2016). Given the original matrix (1):

$$X = \{x_{ij}\} = \begin{pmatrix} x_{11} & \cdots & x_{1m} \\ \vdots & \ddots & \vdots \\ x_{n1} & \cdots & x_{nm} \end{pmatrix} \quad (1)$$

where *i=1,..,n* are the units of analysis and *j=1,..,m* are the variables, we calculate the normalized matrix as follows:

$$r_{ij} = \frac{(x_{ij} - Min_{x_j})}{(Max_{x_j} - Min_{x_j})} * 60 + 70 \quad (2)$$

where x_{ij} is the value of the indicator *j* in the unit *i* and Min_{x_j} and Max_{x_j} are the *goalposts* for the indicator *j*[4]. We chose the goalposts so that 100 represents the value assumed by the EU in all basic indicators in 2010.

The adjusted MPI is given by:

$$AMPI^{\pm} = \mu_{r_i} \pm \sigma_{r_i} * cv_i \quad (3)$$

[4] Let Inf_{x_j} and Sup_{x_j} be the minimum and the maximum of indicator *j* across all time periods considered, and Ref_{x_j} be the reference value for indicator *j*. Then the "goalposts" are defined as: $Ref_{x_j} \pm \Delta$, where $\Delta = (Sup_{x_j} - Inf_{x_j})/2$ (Mazziotta and Pareto, 2017:178).

where μ_{r_i}, σ_{r_i} and $cv_i = \sigma_{r_i}/\mu_{r_i}$ are the mean, the standard deviation and the coefficient of variation of the unit i and the sign $\pm$ depends on the kind of phenomenon measured. In this work, all the composite indices are positive, i.e., increasing values of each index correspond to positive variations of the phenomenon in a specific domain, then AMPI$^-$ is used (Mazziotta and Pareto, 2017).

3. Results and discussion

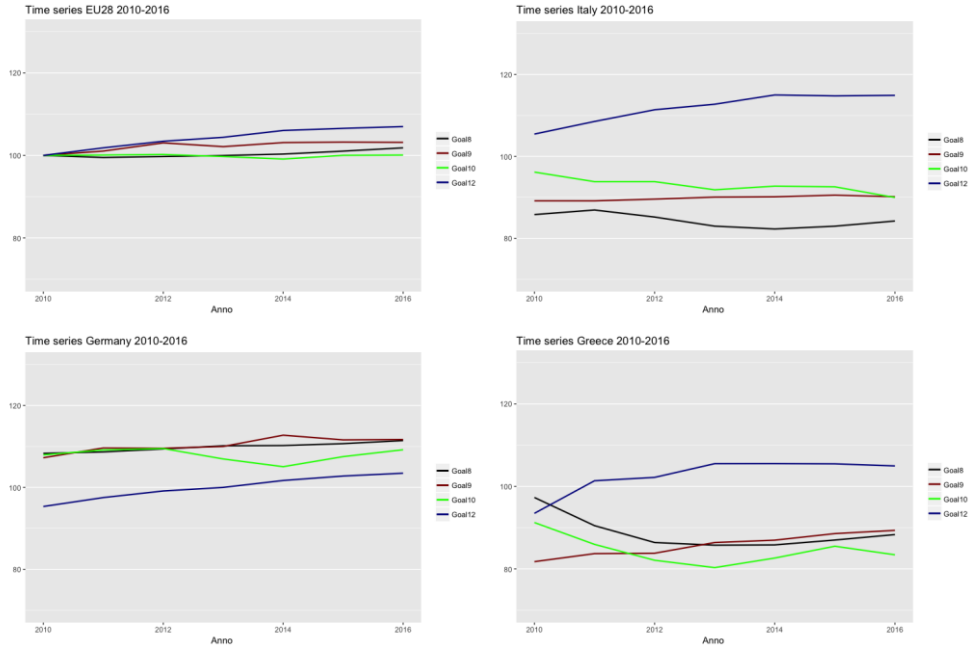
Table 1 presents the values of the composite indices for each goal and those of the *Economic Sustainability Index* (ESI) - constructed synthesizing the previous ones - in 2010 and 2016. The analysis of the values reported in the table seems to confirm the presence of different groups of countries with respect to their levels of economic sustainability. Indeed, some countries have higher values (Germany, Sweden, United Kingdom, Denmark, etc.), while others have lower values (Bulgaria, Croatia, Latvia, Greece, Italy, Spain, Portugal, etc.) than the EU in all the composite indices. As mentioned in section 2, composite indices have been constructed by taking as their goalposts the value assumed by the EU in the basic indicators in 2010. Thus, the value of 100 in the composite indices is set equal to the value of the basic indicators in the EU in 2010. It seems useful to start from an analysis of the evolution of the values of the synthetic indices assumed by the EU in the reference period (2010-2016) and compare them with Italian, Greek and German values. The choice of Germany and Greece is dictated by the will to compare the Italian data with that of countries that express performances that tend to be better (Germany) and worse (Greece) than the Italian ones. For a full and better understanding of the meaning of synthetic indices, it is, also, always necessary to refer to the basic indicators and analyse them.

Figure 2 shows the time series of the synthetic indices for the four goals considered, respectively, for the EU, Italy, Germany and Greece. The trends of the four indices tend to be the same in all four cases considered: in fact, Goal 8 and 9 have moderately positive trends (except in Greece), Goal 12 increases significantly its values in the reference period, while Goal 10 worsens between 2010 and 2016 in all cases examined (except in Germany where, after decreasing, starting in 2014 increases). On the contrary, the values of the indices are profoundly different, with Germany having significantly higher values than those of the EU, Greece much lower values and Italy in an intermediate situation between the two previous nations.

With reference to the European Union, it is possible to observe that there have been some improvements in the values of the indices for all the goals (more marked in Goal 12), except for Goal 10, which has remained virtually unchanged,

since improvements in some basic indicators were offset by a worsening in the *relative median at-risk-of-poverty gap*, which rose from 22.9% (2010) to 25% (2016).

Figure 2 – *Economic sustainability goals: time series 2010-2016 for European Union, Italy, Germany and Greece.*



Germany performs better than Europe in all composite indices, with the exception of Goal 12, where it is 4 points lower on average than Europe for the entire time series. In Germany, in fact, there are worse values than in the EU for some basic indicators considered in Goal 12: the *share of renewable energy* (the value of the indicator rises from 12.9% to 17% in the EU and from 12.9% to 17% in Germany); the *average CO2 emissions per km from new passenger cars* (the value decreases from 140 g CO2 per km to 118 in the EU and from 151 g CO2 per km to 127 in Germany) and the *volume of freight transport cars* (the value decreases from 93.2 tonne-kilometres to 90 in the EU and from 102 tonne-kilometres to 99 in Germany). The best values compared to the EU in the composite indices of Goal 8 and 9 are due to Germany's best performances in all the basic indicators (with the exception of the *percentage of fatal accidents at work*, where Germany has values three times higher than EU).

Table 1 – *Composite indices: Goal 8; Goal 9; Goal 10; Goal 12; ESI; values 2010 and 2016*

	Goal 8 2010	Goal 8 2016	Goal 9 2010	Goal 9 2016	Goal 10 2010	Goal 10 2016	Goal 12 2010	Goal 12 2016	ESI 2010	ESI 2016
EU28	100.00	101.83	100.00	103.16	100.00	100.09	100.00	106.98	100.00	102.93
AUT	103.35	107.08	106.69	117.24	109.69	113.67	98.54	103.47	104.35	110.01
BEL	100.44	103.78	105.78	110.49	112.97	112.83	96.31	101.01	103.37	106.74
BGR	78.47	83.96	81.23	85.45	77.50	74.44	87.79	100.60	80.98	84.75
CYP	93.62	96.45	78.52	79.88	104.65	98.97	92.94	106.28	91.19	94.09
CZE	101.18	103.29	95.25	101.38	105.70	108.45	90.64	97.82	97.75	102.54
DEU	108.31	111.43	107.24	111.69	107.93	109.20	95.34	103.47	104.33	108.81
DNK	114.06	112.20	121.14	119.13	110.40	111.03	105.96	109.41	112.53	112.78
ESP	89.84	92.81	94.12	92.40	88.60	86.25	104.12	112.10	93.64	94.58
EST	90.35	102.02	97.31	99.30	90.10	92.49	85.49	98.42	90.55	97.89
FIN	103.30	102.66	130.15	123.05	116.58	117.37	87.55	94.02	106.36	107.65
FRA	101.41	101.34	100.09	104.70	106.40	110.50	103.63	109.71	102.81	106.39
GBR	112.00	114.36	102.10	106.27	97.85	101.81	101.38	110.31	102.98	107.92
GRC	97.31	88.32	81.76	89.34	91.24	83.42	93.47	104.96	90.46	90.56
HRV	87.83	87.78	84.56	85.59	86.82	92.13	93.00	108.44	87.91	92.34
HUN	88.97	98.49	95.43	95.23	102.70	102.77	92.86	99.88	94.64	98.99
IRL	94.45	105.62	104.16	106.62	105.85	108.98	104.89	115.10	102.06	108.91
ITA	85.80	84.23	89.15	90.15	96.17	89.96	105.46	114.91	93.34	92.84
LTU	89.22	100.38	84.24	87.32	77.55	82.15	92.30	102.46	85.35	92.02
LUX	110.81	110.55	100.48	94.67	121.11	110.70	78.70	85.92	99.58	98.96
LVA	83.25	97.43	84.50	82.19	78.00	86.40	88.88	104.67	83.42	91.54
MLT	100.32	102.93	87.77	87.83	N.A.	N.A.	102.83	111.88	N.A.	N.A.
NLD	114.26	112.10	95.70	104.10	117.00	114.04	98.81	104.37	105.36	108.41
POL	86.05	91.36	83.69	85.95	92.50	96.04	91.34	98.44	88.19	92.62
PRT	90.44	90.10	95.15	94.92	91.24	90.14	105.50	110.76	95.08	95.49
ROU	84.05	83.09	76.44	76.77	77.81	76.85	95.79	107.05	82.59	83.53
SVK	90.96	98.36	88.67	89.24	99.62	103.03	92.34	101.71	92.66	97.69
SVN	98.59	98.96	105.44	106.78	107.91	107.73	95.45	100.89	101.52	103.41
SWE	109.53	111.30	120.14	123.56	112.48	110.43	95.87	104.84	108.57	111.98

The value of Malta for Goal10 and ESI not computed because of lack of data

The values of Greece are lower than those of the EU for all the indices with the exception of Goal 12, where the best Greek performances are linked to lower *energy consumption* (*primary* and *final*) and lower *average CO2 emissions per km*

from new passenger cars. Goal 8 has had a negative trend during the period, decreasing from values in line with those in Europe in 2010 (EU28=100; GRC=100.2) to values below those in 2016 (EU28=102; GRC=96.6).

Although Greece is worse than the EU for several basic indicators (*NEET*, *total employment rate*), the radical worsening of the synthetic index is linked to a significant increase in *long-term unemployment rate*, from 5.7% (EU28=3.8%) in 2010 to 15.6% in 2016 (EU28=3.4%). Goal 10 has significantly lower values than those of the EU for the whole series, due to the fact that in Greece almost all the basic indicators selected (in particular *purchasing power adjusted GDP per capita*, *adjusted gross disposable income of households per capita* and *relative median at-risk-of-poverty gap*) perform worse than in them EU.

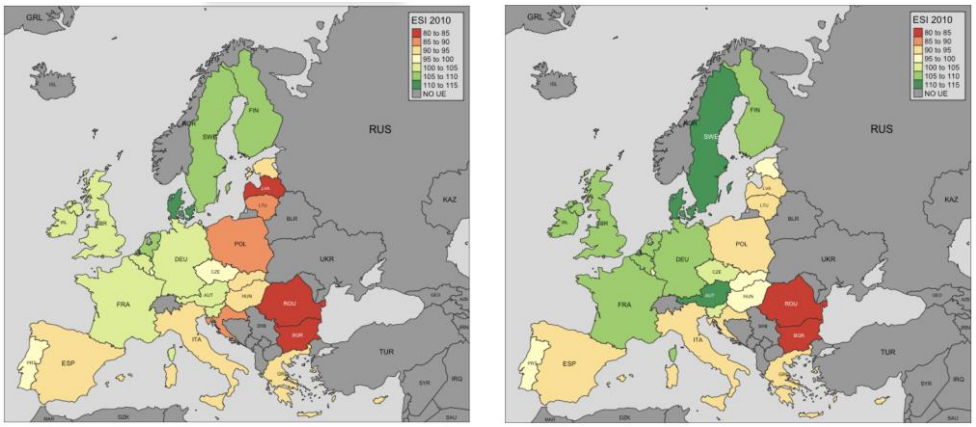
With regard to Italy, we can observe that the synthetic index of Goal 12 shows values that are much higher than those in Europe, as well as those in Germany and Greece, mainly due to better performances in almost all the basic indicators (in particular, *energy productivity* and *share of renewable energy*). In the other goals, Italy has lower performances than the EU ones. In Goal 8, it has the highest levels and the worst trends in Europe for *NEET* (in 2010, EU28=12.8% and ITA=19%; in 2016, EU28=12.8% and ITA=19%), the *percentage of population not seeking employment because discouraged* (in 2010, EU28=1.2% and ITA=3.8%; in 2016, EU28=1.3% and ITA=4.5%) and the *total employment rate* (in 2010, EU28=71% and ITA=62%; in 2016, EU28=73.4% and ITA=65%). In Goal 9, Italy shows rather low values in the *percentage of intramural R&D expenditure* (in 2010, EU28=1.93% and ITA=1.22%; in 2016, EU28=2.03% and ITA=1.29%) and the *percentage of R&D personnel* (in 2010, EU28=1% and ITA=0.6%; in 2016, EU28=1.2% and ITA=0.7%). As regards Goal 10, the Italian trend is worse than the European one for the whole period considered, due to the fact that Italy has the worst value in Europe (except the Romanian one) for the *relative median at-risk-of-poverty gap* (in 2010, EU28=22.9% and ITA=24.8%; in 2016, EU28=25% and ITA=31.6%).

Figure 3 shows two *cartograms*, one for 2010 and one for 2016, with the values of *economic sustainability index* (ESI) for the 28 EU member countries. In 2010, it can be observed that Denmark has the highest value (> 110), while Bulgaria, Croatia, Romania, Lithuania, Poland and Latvia have the lowest ones (< 90). With a score of 93.34, Italy stands between Greece (90.5) and Germany (104.33), along with nations such as Hungary and Spain. In 2016, the highest values of the ESI are recorded for Denmark and Sweden (> 110), while the lowest for Romania and Bulgaria (< 90). Italy shows a not very significant decrease, reaching 92.84, always standing between Greece (90.56) and Germany (108.81).

4. Conclusions

Our analysis focused on the economic dimension of sustainable development, trying to highlight some distinctive features of the EU and some of its Member States. It was evident that there are profound differences between the different countries, in all the goals considered, which suggest the need for different policies and strategic choices to achieve economic sustainability.

Figure 3 – *Economic sustainability Index (ESI): European countries' data 2010 and 2016.*



Appendix

Table A1 – *Basic Indicators: ID; description; polarity*

ID	Basic Indicator	Description	Polarity
		Goal 8	
X1	NEET	Share of the population aged 15 to 29 who is not employed and not involved in education or training.	-
X2	Inactive population not seeking employment	Share of population aged 15 to 64 not seeking employment because think no work is available.	-
X3	Total employment rate	Percentage of total population aged 15 to 64 employed.	+
X4	Long-term unemployment rate	Share of the economically active population aged 15 to 74 who has been unemployed for 12 months or more.	-
X5	Fatal Accidents at work	Number of people killed in accidents of work per 100,000 persons in employment.	-
X6	Involuntary temporary employment	Percentage of employees aged 20 to 64 working on fixed-term contracts because they were unable to find a permanent job on total employees.	-
X7	Percentage of GDP per capita	Percentage of GDP per capita on EU28 total per capita (EU = 100, based on million purchasing power standards).	+
X8	Resource productivity and domestic material consumption	Gross domestic product (GDP) divided by domestic material consumption (DMC) - Euro (chain-linked volumes, 2010) per kilogram DMC.	+

Goal 9			
X9	Employment in high and medium-high technology manufacturing sectors and knowledge-intensive service sectors	Share of employment in high and medium-high technology manufacturing sectors and in knowledge-intensive service sectors on total employment.	+
X10	PCT Intramural R&D expenditure (GERD)	Gross domestic expenditure on R&D (GERD) as a percentage of the gross domestic product (GDP).	+
X11	R&D personnel	Share of R&D personnel broken down by the following institutional sectors: business enterprise (BES), government (GOV), higher education (HES), private non-profit (PNP).	+
Goal 10			
X12	Purchasing power adjusted GDP per capita	Purchasing power adjusted GDP per capita	+
X13	Adjusted gross disposable income of households per capita	The indicator reflects the purchasing power of households and their ability to invest in goods and services or save for the future, by accounting for taxes and social contributions and monetary in-kind social benefits.	+
X14	Relative median at-risk-of-poverty gap	Distance between the median equivalised total net income of persons below the at-risk-of-poverty threshold and the at-risk-of-poverty threshold itself, expressed as a percentage of the at-risk-of-poverty threshold.	-
X15	Gini coefficient of equivalised disposable income	Extent to which the distribution of income among individuals or households within a society deviates from a perfectly equal distribution.	-
X16	Income share of the bottom 40 % of the population	Income share received by the bottom 40 % of the population	+
Goal 12			
X17	Primary energy consumption	Total energy demand of a country excluding all non-energy use of energy carriers (e.g. natural gas used not for combustion but for producing chemicals) divided the amount of population. It covers the energy consumption by end users such as industry, transport, households, services and agriculture, plus energy consumption of the energy sector itself, losses occurring during transformation and distribution of energy.	-
X18	Final energy consumption	Total energy demand of a country excluding all non-energy use of energy carriers (e.g. natural gas used not for combustion but for producing chemicals) divided the amount of population. It only covers the energy consumed by end users, such as industry, transport, households, services and agriculture, it excludes energy consumption of the energy sector itself and losses occurring during transformation and distribution of energy.	-
X19	Energy productivity	Amount of economic output that is produced per unit of gross inland energy consumption.	+
X20	Share of renewable energy	Share of renewable energy consumption in gross final energy consumption according to the Renewable Energy Directive.	+
X21	Resource productivity and domestic material consumption (DMC)	Gross domestic product (GDP) divided by domestic material consumption (DMC).	+
X22	Average CO2 emissions per km from new passenger cars	Average carbon dioxide (CO2) emissions per km by new passenger cars in a given year.	-
X23	Volume of freight transport	Ratio between tonne-kilometres (inland transport only) and GDP (chain-linked volumes, at 2005 exchange rates). It is indexed on 2005	-

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SUMMARY

Sustainable Development and National Differences: an European Cross-National Analysis of Economic Sustainability

The 2030 Agenda for Sustainable Development (2015) can be considered the synthesis of a debate, which sets the sustainable development as a priority for the International Community, committing Member States of the United Nations collectively to achieve by the year 2030 a series of sustainable development goals (SDGs) in the social, economic and environmental fields. The achievement of the SDGs has therefore made necessary to develop a system of indicators, to evaluate and compare the state of achievement of the over 100 targets in which the 17 SDGs are organized. In this paper, we would like to analyze the situation of some European countries in terms of achievieng SDGs. We focus on the four goals belonging to the economic dimension of sustainable development, in particular comparing the situation of Italy with that of the other nations of the European Union. The research methodology is to use the Adjusted Mazziotta-Pareto Index (AMPI) for creating a composite index for each goal considered, and then to construct the synthetic measure of economic sustainability, taking into account the previous indices.

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DECENT WORK BETWEEN HUMAN RIGHTS AND SOCIAL SUSTAINABILITY: CONSIDERATIONS ON RELATIONSHIPS BETWEEN PRINCIPLES, INDICATORS AND ATTAINMENTS OF GOALS

Paola Conigliaro

1. Decent work as a cornerstone of human development

The principles of Decent Work inspire today the struggle against poverty and the promotion of an equitable, inclusive and sustainable development. Work has a central role in the determination of quality of life although relationships between individuals and their job change according to different conditions and contexts. For many people, paid work is a guarantee of livelihood, an opportunity to be autonomous, to affirm their own role, identity and dignity. For some (especially women), it is the sole way to emancipate themselves from seclusion and abuse (Nussbaum, 2011), as long as work relationships do not replicate analogous forms of subjection. Work allows self-realization. The Declaration of Philadelphia (ILO, 1944) affirms that workers have the right to pursue thorough work "their spiritual development" as well as "their material well-being", because they are able to "make their greatest contribution to the common wellbeing" (Art.3, b).

Work supports inclusion of more vulnerable people, such as those suffering from mental illness, but it may also represent a threat to the mental health of workers in stressful working conditions (WHO, 2010). Well-being at work and well-being in the whole society are interrelated: labour market conditions may influence the relationships within an organisation; on the other hand, an organizational discomfort may affect performances, with severe consequences on customers or other stakeholders.

Relationships between work conditions and subjective well-being lie on multiple levels.

In this article, I propose to explore the multidimensionality of the quality of work, putting in relation different definitions of the concept that complement each other.

2. Decent work as a Universal Human Right

Article 23 of the Universal Declaration of Human Rights (1948) ratified the right to work as a Universal Human Right. The European Pillar of Social Rights (European Commission 2017) expresses principles and rights essential to fair and well-functioning labour markets and welfare systems in the Europe of the 21st century.

Universal rights are consubstantial with the nature of human beings, without any other specific qualification. So the right to work impacts on those that can work (labour force), as much as those that cannot.

The aim to provide a job for all and the commitment to improve work conditions for every worker are mutually supporting aspects of a virtuous action.

The International Labour Organisation (ILO)[1] formulated the Decent Work Agenda in 1999 (ILO, 1999), defining four pillars and ten dimensions of decent work. They concern employment opportunities, adequate earnings, decent working time, combining work and personal life, work that should be abolished, stability and security of work, equal opportunity, safe work environment, social security and social representation.

General principles of decent work are of course consistent with those enunciated by the Universal Declaration of Human Rights and by the European Pillar of Social Rights.

The Agenda 2030 defining the Sustainable Development Goals (SDGs) assumed Decent Work for all as a component of Goal 8 (UN General Assembly 2015, 2017). Nevertheless, the ILO is custodian of other indicators within Goal 1, 5 and 10 (ILO, 2017b).

The eradication of slavery and child labour are the absolute priorities for the Decent Work Agenda and for SDG 8.

In any event, freedom of choice, equitable salary, safety and salubriousness, respect, absence of discrimination are necessary conditions in the aim of decent work for all.

3. Principles and Indicators of Decent Work

There are many sets of indicators to assess decent work[2]. They concern both labour perspective during the course of life and the effective conditions of work.

[1] The ILO is a tripartite agency of the United Nations, created in 1919, as part of the Treaty of Versailles that ended World War I, with the aim of supporting peace and social justice, applying those principles to the domain of work.

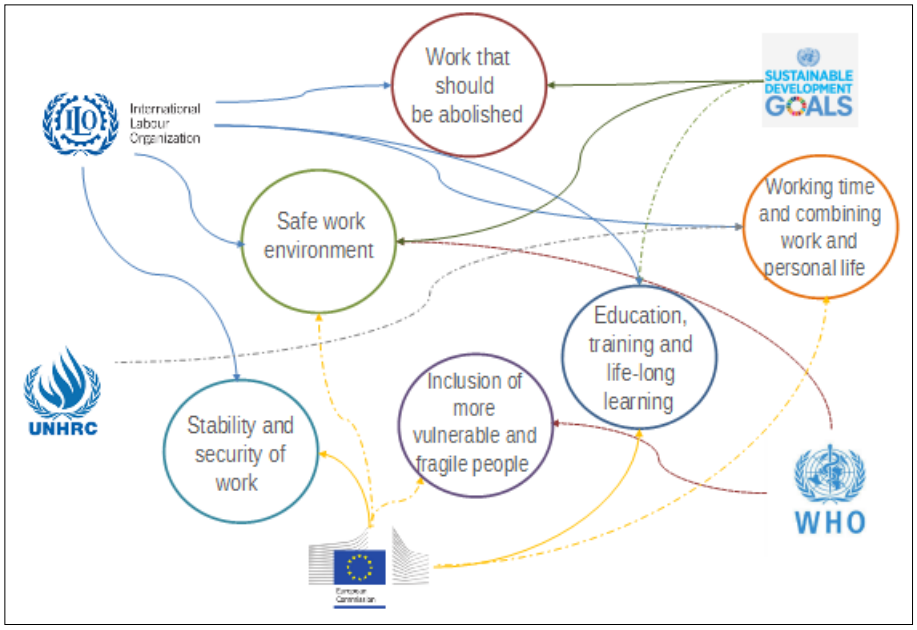
[2] More information on sets of indicators in Appendix.

Job quality, employment quality, work conditions are, in fact, all multidimensional concepts. Each method has its peculiarity: some sets focus on economic measures, others on safety, health and well-being at work. Most of them deal with aggregate data to compare the results in different geographic areas or in a longitudinal perspective.

The ILO defined a set of more than 70 indicators (90 in total) (ILO, 2013). The European Pillar adopted 16 indicators related to decent work, and another five which focus on social security (European Commission, 2018). The UN Economic Commission for Europe itemises a list of about 70 indicators to assess quality of employment, affirming that it represents the workers' perspective (UNECE, 2015).

The European Foundation for the Improvement of Living and Working Conditions (Eurofound), [3] adopted a pattern of quality of work conditions based on seven dimensions (Eurofound, 2012).

Figure 1. *Principles and indicators of decent work. The role of the institutions*



A very relevant issue of job quality is the working time quality. The Universal Declaration of Human Rights (art.24) underlines the relevance of leisure and rest, and the right to reasonable limitation of working hours and periodic holidays with pay. Combining work and personal life is a fundamental principle for the ILO and

[3] A tripartite agency of the European Union.

for the European Pillar. Eurofound and the UNECE defined indicators to assess quality of working time, while neither the SDGs nor the European Pillar adopted an indicator to reveal the work-life balance.

Life-long learning in another important issue. The European Pillar included it between their principles and it is one of the ILO job quality indicators. The Agenda 2030 included the item within Goal 4, but it did not define any indicator to measure that target.

The European Pillar recognizes the right of Inclusion for more vulnerable and fragile people. The ILO and the WHO underlines the relevance of the inclusion in pursuing social justice and health for all. Neither the SDGs nor European Pillar adopted an indicator to reveal the existence of inclusive actions.

Figure 1 depicts the main principles and their connection with the subjects involved. The solid lines concern principles measured with at least one indicator by the proposing entity, the dashed lines refer to principles that are only enunciated but not assessed at all.

4. Work and social conditions in the world

This paragraph presents some data about work conditions in the world, with some information about Italy. We can easily compare these data with the announced principles of decent work.

With regard to the work system, data (ILO 2017) describe an economic context unable to improve quality or quantity of employment. Even economic growth does not guarantee, per sé, decent jobs and income equality (social justice). "This is (...) the paradox that the extraordinary advances in the productive capacity of the global economy now provide the material means to eliminate poverty and meet human needs as never before, but are singularly failing to do so." (ILO 2015, p.2).

There are 152 million child workers (between 5 and 17 years) in the world, 73 million are employed in hazardous jobs, and half of them are younger than 12 years old. There are 40.3 million forced workers, representing 5.4 per thousand of the world population, of which one quarter are minors.

The total number of unemployed in 2017 amounted to 192 million and it is expected to remain stable in 2018. In 2019, the global unemployment rate will remain essentially unchanged (5.5% of the active population), whereas the number of unemployed is projected to grow by 1.3 million (ILO 2018).

In Italy, there are 2.9 million unemployed, which constitute 11% of the active population. Unemployment affects 12.5% of women and 31.7% of young workers, under 24 years old (Italian National Institute of Statistics – Istat - March 2018).

Differences between regions are very considerable, with an unemployment rate in 2017 of 6.3% in the Northeast and of 19.4% in the South of Italy (Istat, 2018)

In 2017, around 42% of workers (1.4 billion) worldwide are estimated to be in vulnerable forms of employment. This share is expected to remain particularly high in developing and emerging countries (76% and 46% respectively).

More than 300 million workers in emerging and developing countries are poor, having a per capita household income or consumption of less than US$1.90 (PPP). In developing countries, they amount to 40.1% of workers

Only 45% of the world population is covered by at least one social protection benefit.[4] Four billion people in the world (55%) are still unprotected. Only 29% of the global population has access to comprehensive social protection.

In Italy, 2.7 million workers are in temporary employment. More than one million have a part-time contract, which is involuntary for 62% of them.

Every year in the world, 2.78 million workers die and 374 million workers are victims of a non-fatal work-related injury and illness (ILO esteem). In Italy, the Italian national institute for occupational accident insurance registered 1,029 deaths and 635,433 injuries during 2017 (INAIL, 2018).

Principles and outcomes seem to be increasingly divergent.

5. Labour conditions in a perspective of social sustainability

The SDG 1 aims to eradicate poverty, but data register a dramatic persistence of poor-quality employment. Especially in emerging and developing countries, vulnerable work is synonymous with extreme poverty. In developing countries, workers cannot usually count on social transfers because there are no strong social security systems. On the other hand, many mature systems of protection are faced with challenges of economic sustainability.

To achieve the goal of decent work for all, the entire complex set of rules and recommendations defined at international level has to be translated into practical applications able to impact on workers' lives and personal well-being.

The referring pattern of decent work is the "standard" job, which corresponds to a stable job, lasting for the entire working life, resulting in a professional or technically specialized competence and envisages an educational and training coherent course.

If we assume a global vision, we have instead to recognize the absolute prevalence of "non-standard" working conditions. In the pursuit of decent work for all, it is necessary to take account of these constraints.

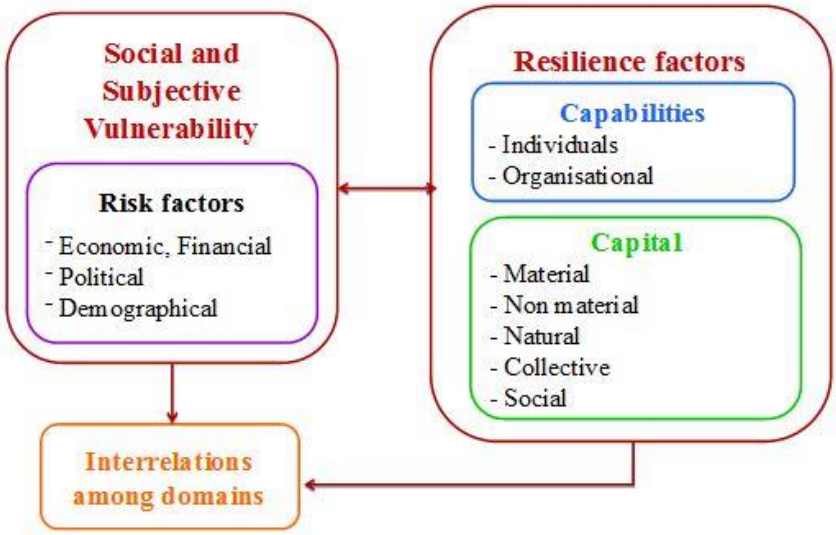
[4] Social protection relates to several SDGs' targets.

A high level of inequality endures between countries, and within countries between different social groups. We have also to consider the relevance of some contextual conditions like demographic trends, climate change, depletion of natural resources, micro and widespread conflicts, globalization, financialisation and technological innovation. They are unanimously acknowledged as strongly influencing the structure and dynamics of work.

Companies, stressed by market pressure, require greater flexibility from workers. This often means short-term contracts or adaptation to spatial and functional changes. Workers always have to be available, and efficient; frequently, they are not sufficiently updated, informed and consulted. These circumstances increase physical and psychological risks. Ever-changing sets or jobs deplete relationships with colleagues and undermine social support in the work context.

There is a portion of workers, especially in developed and emerging countries, that are completely monopolized by work because the boundaries between private life and work collapse. They follow a pattern of total and absolute readiness. Many forms of self-employment conceal a subordination, pillaged of every elementary right, or a form of precarious work, without rules and social protection. Most of people, especially young people, have little opportunity of choosing the job they get.

Figure 2. *Sustainability conceptual framework applied to decent work*



In the context of fragmented functions, and highly specialised training, competence becomes rapidly obsolete. Professional identity becomes weaker,

because working paths lose their clarity, also compromising connections with colleagues. These conditions affect the solidity and serenity of workers.

Furthermore, due to high unemployment rates and precarious job security, younger generations do not see many opportunities of stable income and professional development. The majority may not make work central to their life projects because they cannot identify with a hostile system.

These factors threaten the achievement of decent work for all and, in a wider sense, social sustainability. Therefore, this poses the question as to which resources are able to counter these threats

The Scientific Commission on measures of equitable and sustainable well-being defined a conceptual framework of sustainability (Istat, 2015) which considers resilience and vulnerability factors. Figure 2. depicts a simplified application of the framework to the domain of decent work.

We have seen what the main factors of vulnerability are and, in the same way, we can consider some relevant factors of resilience to promote.

1. Education and life-long learning supports the development and enforcement of capabilities (i.e. being, functioning and freedom of choice) and allows people to pursue their goals and to take their place in the society. There are different visions about which kind of education could be more effective. Training oriented to fit the labour market offers highly specialized profiles. It provides a strong identification with a role or a profession, high levels of competence and better performance, but it is threatened by precariousness. For this reason, to address the challenges of an ever-changing world of work, education focused on the person is probably more effective because it makes the individual capable of facing many different problems with an open mind.
2. The distinctive characteristics of people and organisations, even cultural differences, are resources which can be used to face current and future needs; different points of view can be instrumental in creatively overcoming new challenges. Therefore, it is fundamental to support organizational cultures, experiences, attitudes, knowledge, and skills. The valorisation of small and medium-sized companies is an important strategy in the safeguarding of this "socio-diversity". Supporting small businesses and self-employed workers, in any case, requires enforcing public control on compliance with occupational safety standards and fair working conditions.

Among the resources available to face current and future needs are the social relationships of individuals and organisations. A winning strategy in terms of resilience is to support networking, based on fair interaction between different subjects involved in the productive process.

6. Concluding remarks: a brief note on an indicator

As a result of analysing different sets of indicators, it seems clear that, sometimes, similar terms hide different goals and values. An example of similar concepts used in very different way is that of labour productivity and productive work.

Target 8.2 of the SDGs aims to "Achieve higher levels of economic productivity..." and indicator 8.2.1 specifies that development in productivity is measured by the "Annual growth rate of real GDP per employed person", so if we reduce the denominator (number of employees), we enhance productivity. Furthermore, this indicator represents another way to emphasize the relevance of GDP growth in the aim of development. Even the ILO defines labour productivity in a similar way.

More than one doubt may arise as to whether this is an effective measure of progress, in terms of sustainability and decent work for all. From a systemic point of view, in truth, it is noticeable that promoting this kind of productivity may generate severe trade-offs in terms of exploitation of natural resources, pollution and unemployment.

We can instead consider another way to measure productivity. If we assume as a goal productive work as work able to assure adequate earnings to workers, policies will be quite different. "Adequate earnings and productive work" is one of the dimensions of decent work (ILO) and it is defined by eight indicators:

1. working poverty rate;
2. employees with low pay rate (below 2/3 of median hourly earnings);
3. average hourly earnings by occupation group;
4. average real wages;
5. minimum wage as a percentage of median wage;
6. manufacturing wage index;
7. employees with recent job training (past year / past 4 weeks);
8. statutory minimum wage.

This way to measure productivity is, of course, consistent with the principles of decent work. We also hypothesize a positive relationship in connection with the attainment of social justice and equity, while we do not see evident negative impacts of the growth of this value on the environmental conditions.

As we can see, the indicators are not neutral and their meaning is not obvious. They consistently show a close relationship with the values and objectives of those who evaluate.

Appendix

Dimensions and indicators of quality of work

- ILO - Decent Work Agenda found on four strategic pillars: 1. Standards and fundamental principles and rights at work; 2. Employment; 3. Social protection; 4. Social dialogue. The ten dimensions of decent work are employment opportunities, adequate earnings, decent working time, combining work and personal life, work that should be abolished, stability and security of work, equal opportunity, safe work environment, social security and social representation. In total, ILO defined a set of 90 indicators of decent work. Some of them are candidates for the future, or additional. Indicators are statistical or legal. EC – The European Pillar of Social Rights rests on 21 key principles, according to three main issues: 1. Equal opportunities and access to the labour market; 2. Fair working conditions; 3. Social protection and inclusion. In 2018, EC released the social scoreboard of composite indicators available on line.
- UNECE – The framework to assess quality of employment identifies seven dimensions and twelve sub-dimensions: 1. Safety and ethics of employment - a. Safety at work, b. Child labour and forced labour, c. Fair treatment in employment; 2. Income and benefits from employment - a. Income, b. Non-wage pecuniary benefits; 3. Working time and work-life balance - a. Working hours, b. Working time arrangements, c. Work life balance; 4. Security of employment and social protection - a. Security of employment, b. Social protection; 5. Social dialogue; 6. Skills development and training; 7. Employment-related relationships and work motivation - a. Employment-related relationships, b. Work motivation.
- EUROFOUND - Eurofound outlined a conceptual framework which relies on seven objective dimensions and 21 sub-dimensions: 1. Physical environment - a. Posture-related (ergonomic), b. Ambient (vibration, noise, temperature), c. Biological and chemical; 2. Work intensity - a. Quantitative demands, b. Pace determinants and interdependency, c. Emotional demands; 3. Working time quality - a. Duration, b. Atypical working time, c. Working time arrangements, d. Flexibility; 4. Social environment – a. Adverse social behaviour, b. Social support, c. Management quality; 5. Skill and discretion - a. Cognitive dimension, b. Decision latitude, c. Organisational participation, d. Training; 6. Prospects - a. Employment status, b. Career prospects, c. Job security, d. Downsizing; 7. Earnings

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SUMMARY

Decent Work Between Human Rights and Social Sustainability: Consideration on relationships between principles, indicators and attainments of goals

The principles of decent work are fundamental in a sustainable development rationale. They belong to the sphere of social, more than economic, sustainability. There are several measurements of decent work. The choice of indicators to measure decent work is not neutral. They derive from the values framework of those who evaluate. Within the logic of sustainability, we register many elements of vulnerability. Among the resilience factors, we have identified education, social diversity and equal social networks

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DO SUSTAINABLE WELL-BEING INDICATORS AFFECT GDP? EVIDENCE FROM A LONGITUDINAL STUDY IN ITALY BASED ON BES APPROACH

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1. Introduction

The generally shared definition of "sustainable development" linked to the compatibility between the development of economic activities and the protection of the environment (Amerighi & Felici, 2011) is to continue the economic and social development that ensures the satisfaction of the needs of the present generation without compromising the ability to meet those of future generations. Following this approach, the GDP is not the only right measure of economic growth (Van den Bergh, 2009; Maccari et al., 2013). At the Earth Summit held in Rio in 1992, the foundations were laid for the political realization of sustainable development, and Agenda 21, the action plan for the 21st century, was presented. In 2012, at the Rio+20 Conference, in the report "The future we want" the commitments were renewed and the necessary steps were defined to move towards sustainable development.

The United Nations General Assembly adopted in September 2015 the 2030 Agenda for sustainable development, in which the guidelines of activities for the coming years are outlined at global level (UN Resolution A7RES/70/1, New York September 2015). In the same year, in line with the 2030 Agenda, the Paris Climate Agreement (UN decision 1/CP.21) and the Sendai Framework for Disaster Risk Reduction (Third UN World Conference on Disaster Risk Reduction) were also adopted. On the European Statistical Conference mandate and thanks to the collaboration between Unece, Eurostat and Oecd, since 2005, a working group is producing a solid framework based on theoretical principles and practical rules that act as a guide for the consistent and coherent construction of indicators for the measurement of sustainable development. According to the original mandate, the working group was called to build a conceptual framework on sustainable development based on the approach of capital (economic, natural, human and social), identifying domains and indicators (core set and small set) associated with each domain and comparable on an international level.

In 2009 the task force published the first report according to the approach described above, where sustainability is determined by the presence of a per capita wealth that is not decreasing in time and left available to future generations. The conceptual framework is therefore centered on the measurement of stocks and flows relative to capital, divided into economic (physical capital, knowledge capital, financial capital), natural (according to the System of Environmental-Economic Accounting - Seea), human (physical indicators and monetary indicators as the cost based approach, the discounted life-time income approach, the human capital satellite accounts) and social capital (based on relationships and trust between people and institutions). This vision was conceived precisely to evaluate the existing trade-offs between the various capitals, as the goal of sustainable development is to ensure that capital as a whole is left available to future generations and therefore momentary or permanent reductions of capital (i.e. natural) is offset by changes of opposite sign of another capital (e.g. human).

In 2014 a second report was published, in which sustainable development is seen as a choice between maximizing current welfare and conserving resources for future use, or as a development that meets the needs of the present without compromising the possibility of future generations to satisfy their needs. At the same time, sustainable development is seen as the ability to maximize the well-being of a country not at the expense of another and to manage in a sustainable perspective the depletion of natural resources, climate change and other factors that will distinguish future societies in the long run. The indicators were chosen on a theoretical basis, also taking into account the qualitative levels set by the standards of the National Statistical Institutes, as well as the real availability of data at the level of international organizations. In the context of ongoing work, a still open question is whether capital, above all natural, human and social, can be represented by monetary measures. Currently, after having carried out a pilot exercise of real measurability of the framework, it is under discussion how to adapt this conceptual scheme to the discussion that is taking place on the Sustainable Development Goals (SDGs) indicators at world level (Hak et al., 2016).

The 17 SDGs that make up the 2030 Agenda refer to different areas of social, economic and environmental development that must be considered in an integrated manner, as well as to the processes that can accompany and support them in a sustainable manner, including international cooperation and the political and institutional context. Numerous references to the people well-being and to an equitable distribution of the benefits of development are present as indispensable components. These are the objectives, also declined in 169 goals (UN, 2016):

1. no poverty: put an end to all forms of poverty in the world;
2. zero hunger: achieve food security, improve nutrition and promote sustainable agriculture;

3. good health and well-being: ensuring it for everyone and for all ages;
4. quality education: provide fair and inclusive education, and promote learning opportunities for all;
5. gender equality: reaching it and empowering all women and girls;
6. clear water and sanitation: ensure the availability and sustainable management of water and sanitation facilities to all;
7. affordable and clean energy: ensure everyone has access to affordable, reliable, sustainable and modern energy systems;
8. decent work and economic growth: encouraging lasting, inclusive and sustainable economic growth, full and productive employment and decent work for all;
9. industry innovation and infrastructure: build a resilient infrastructure, promote innovation and fair, responsible and sustainable industrialization;
10. reduced inequalities: within and between nations;
11. sustainable cities and communities: make cities and human settlements inclusive, safe, resilient and sustainable;
12. responsible consumption and production: guarantee sustainable production and consumption models;
13. climate action: take urgent measures to combat climate change and its consequences;
14. life below water: conserve and sustainably use oceans, seas and marine resources;
15. life on land: protect, restore and promote sustainable use of the earth's ecosystem, manage forests sustainably, combat desertification, stop and reverse land degradation and halt the loss of biological biodiversity;
16. peace, justice and strong institutions: promote peaceful and inclusive societies for sustainable development, make access to justice for all available and create effective, responsible and inclusive bodies at all levels;
17. partnership for the goals: strengthen the means of implementation and renew the global partnership for sustainable development.

Several are the indicators that are commonly used in policy practice in order to take into account for these objectives (Singh et al., 2009) even if recent studies show that policymakers should use several new indicators that are regularly used by lay people because most of actual indicators did not reflect the meaning intended by the government (Tasaki & Kameyana, 2015). However, the 2030 Agenda for Sustainable Development represents the United Nations global action plan for people, for the planet and for prosperity, which takes into account the need to support universal peace, freedom, to eradicate poverty in all its forms and dimensions, achieving a sustainable transformation of society, economy and environment between now and 2030, also in terms of safety, well-being and justice.

2. Measuring the sustainable well-being in Italy: the BES (Benessere Equo e Sostenibile) framework

In this framework, the National Statistical Institutes assume a relevant role, both as referents of international agencies and for their own methodological and technical know-how: several National Statistical Institutes are part of the High level group (among these Italy), the UN Secretary-General's Independent Expert Advisory Group on the Data Revolution for Sustainable Development (IEAG) and the expert groups that are working on the completion of the SDGs indicators and their breakdowns. Furthermore, the National Statistical Institutes play the role of coordinators of national initiatives, of data providers and guarantors of their quality, of studying and experimenting with alternative data sources (Giovannini et al., 2012). In addition to providing a significant contribution to international activities, ISTAT has launched a study on the indicators proposed by the IEAG: for those already available they are proceeding with the calculation and dissemination, while for those not yet elaborable they are preparing, together with the national stakeholders, the actions necessary to guarantee their availability and timeliness. The international efforts that have made the SDGs framework possible have also determined its importance as a reference benchmark for the many conceptual frameworks developed both nationally and internationally, on issues of well-being, quality of life, sustainable development (Hedlund-de Witt, 2014). Many organizations are already thinking about how to align these frameworks with the SDGs and how to decline the lines of activity already in place with respect to the indications of the Agenda 2030.

Also in Italy, the introduction of the SDGs implies the need for a study of harmonization with previous experiences, such as the indicators of "Fair and Sustainable Wellness" (Benessere Equo e Sostenibile: BES) developed by Istat since 2013, which have now become a reference point at national and territorial level ("Provincial BES" and "UR-BES" initiatives). The conceptual structure of the BES appears very close to that of the SDGs, with some significant differences (for example, in the BES the international cooperation dimension is absent). Many of the 17 Goals can easily be traced back to the different categories of the BES (Giovannini, 2011), which considers 9 domains related to aspects that directly influence well-being (health, education and training, work and reconciliation of life time, economic welfare, social relations, safety, subjective well-being, environment and landscape, and cultural heritage) and three instrumental or context domains (politics and institutions, research and innovation, and service quality). The strong overlap between the issues covered by the BES indicators and those included in the SDGs represents a great opportunity for our country to make an extraordinary cultural leap. These are two contiguous but different areas, being the focus of the

BES on outcome measures related to the different domains relevant to the wellbeing of people and society, while the SDGs also refer to the key factors of development, in terms of input, highlighting explicitly through the targets the call for political initiatives in the social, economic and environmental fields.

Here is a first summary in which the areas with contact points between the two frameworks are indicated, even if only partial, and therefore with similar or assimilable indicators, although the conceptual boundaries of the SDGs and the BES dimension are often substantially different. However, only in a limited number of areas the two schemes are not comparable with each other: this happens in cases where the BES refers to indicators built from ad hoc surveys, such as for the subjective well-being dimension, hardly globally estimable and for a goal of the SDGs (Climate action) mainly oriented to national policies implemented by governments, a conceptually absent dimension in the BES. The intersection in the other domains is not surprising because the concept of sustainable development made by the United Nations also includes progress in the living conditions of the populations, and this opens up interesting perspectives in terms of alignment and mutual reinforcement of the two frameworks. Reconciling the level of ambition of the SDGs targets and indicators defined at the global level with the specific experiences of the countries is certainly a challenge for statistics, but also an opportunity for the national statistical system and for the country. To satisfy the global and national information demand together, Istat continues to strengthen and develop statistical measures that allow the monitoring of progress towards the Sustainable Development Goals, considering their interrelation, the factors that may condition their achievement, the potential synergies between SDGs statistical indicators and those for specific policies.

Every year Istat presents an update and an expansion of the disaggregations of the already widespread indicators and a further set of elements useful for measuring sustainable development and monitoring its objectives. In the last Report, 109 SDGs are considered through 201 indicators (72% of which are also territorial breakdowns): 74 indicators coincide with those defined at international level, 78 are similar or partial (ie not all data are available or not all of them are in the specificity required) and 49 to provide further elements useful for understanding and monitoring the "national context". The Health target sees the highest number of SDG measures available (17 for a total of 31 indicators), followed by the Job objective (12 for a total of 20 indicators). The Legislative Decree n. 322 of 6 September 1989, the United Nations Statistical Commission for the implementation of the Agenda 2030 and the European Economic Commission entrust Istat with a coordinating role: on the one hand, the Institute coordinates the offer of official statistics produced by the various institutional actors belonging to the National Statistical System (Sistan); on the other hand, the international

community attributes to national statistical institutes the task of coordinating the production of SDGs at a national level. Italy has played a major role in all phases of the UN negotiations that led to the adoption of the Agenda 2030 and the commitment of our country has also translated into some concrete steps. One in all, in the drafting of the Economic and Financial Document (DEF) 2017 adopted by the Council of Ministers, our Government has included - in addition to the Gross Domestic Product (GDP) - some indicators of the BES: Italy was the first, in Europe and among the G7 countries, to equip itself with this instrument for measuring the condition of the country that looks at concepts very close to those incorporated in the SDGs. In the DEF, the past and future evolution of four significant indicators for the quality of life of citizens has been presented, on an experimental basis with respect to the deadlines envisaged by the legislation: average available income, an income inequality index, the rate of not participation in work and emissions of CO_2 and other climate-altering gases. The introduction of the BES indicators helps to give a change of approach to the vision of economic development of our country, because it introduces the principle that if well-being benefits from the increase of the gross domestic product does not mean that it coincides with it.

3. The data

The awareness about the relevance of "Benessere Equo e Sostenibile" indicators in terms of economic and financial planning has reached the pick recently with the declaration by the Italian Government to monitor the progress of some BES indicators considered relevant within the annual DEF. In particular, the Government with the Committee for BES indicators, have enforced the monitoring of 12 indicators included in the dimensions of the BES. Specifically these are:

1. available average income adjusted per capita;
2. index of inequality of disposable income;
3. index of absolute poverty;
4. life expectancy in good health at birth;
5. excess weight;
6. early exit from the education and training system;
7. rate of non-participation in the work, with relative breakdown by gender;
8. ratio between the employment rate of women aged 25-49 with preschoolers and women without children;
9. predatory crime index;
10. index of efficiency of civil justice;
11. CO_2 emissions and other altering climate gases;
12. index of illegal construction.

However, for the transitional phase 4 indicators have been selected on the 12 mentioned, which are:
1. Available average income adjusted per capita;
2. Index of inequality of disposable income;
3. Rate of non-participation in the work, with relative breakdown by gender;
4. Emissions of CO_2 and other altering climate gases.

In this paper we want to study the impact of the 12 selected indicators on the GDP growth rate of the Italian regions and on Italy itself, first considering the 4 indicators selected for the transitional phase and then all 12, trying to understand which of these have an impact (and what magnitude) on economic growth and which have not (Tab.1).

Table 1 – *Descriptive statistics of data.*

Variables	Mean	St. Dev.	Min	Max
Gdp growth rate	-0.0041268	0.199193	-0.0709512	0.0880617
Net average avaiable income	17814.93	3492.195	11989.11	24623.2
Index of avaiable income inequality	5.1730043	1.257491	3.6	10
Poverty risk	18.68783	9.94999	5.4	42.3
Life expetancy	82.42957	0.6963531	80.4	83.8
Overweight	44.65043	4.485403	35.7	53.4
Early exit from the education system	14.32	4.368291	6.7	25.4
Work non-participation rate	20.5887	10.72943	4.8	43
Woman employment ratio	79.23913	6.677938	62.4	95.4
Predatory crime index	96.48783	8.726257	76.8	113.2
Justice efficency index	421.4252	228.6827	102.3	974
Index of overall enviromental conditions	104.3165	7.259355	89.4	121.2
Index of illegal constructions	21.72609	20.4907	1.3	71.1

It is not the first time that a similar study is conducted (see e.g. Tampakoudis, 2013 or Lapinskiene, 2011 regarding to cross-country competitiveness), but it is the first time that the BES indicators are used for this purpose. The data are based on the latest BES report of 2017 (ISTAT, 2017) and consists in the observation of the GDP growth rate for Italy and the Italian regions in the last 5 years (from 2012 to 2016) which is used as a dependent variable and by observation of the 12 indicators of fair and sustainable development, also these observed from 2012 and 2016. The panel is balanced and consists of 23 groups observed for a time horizon of 5 years, for a total of 115 observations. However, two indicators of the 12 have been replaced by two similar ones due to a lack of data at the regional level. For example, both the absolute poverty index and CO_2 emissions are only available in aggregate for Italy and not for its geographical distribution. For this reason the absolute poverty index has been replaced with the risk of absolute poverty, while CO_2 emissions have been replaced with a composite index on the environment. In this case, both indicators are now available for Italy and for its breakdowns.

4. Methodology and results

From a methodological point of view, it was performed a fixed effect regression, regressing first the GDP growth rate with the first four *Benessere Equo e Sostenibil*e indicators within the DEF 218. The regression model is developed as follow:

$$GDPgrowth_{i,t} = \\ = \beta_0 + Net\ average\ avaiable\ income_{i,t}\beta_1 + \\ + Index\ of\ avaiable\ income\ inequality_{i,t}\beta_2 + Work\ non\ participation\ rate_{i,t}\beta_3 + \\ + Index\ of\ overall\ enviromental\ condition_{i,t}\beta_4 + \varepsilon_{i,t} \quad (1)$$

The results of the regression model (1) are showed in Tab. 2.

Table 2 – *Results of the regression model (1).*

GDP	Coeff.	St. Error	t	p-value
_cons	-0.6143202	0.12990253	-4.76	0.000***
Net average avaiable income	0.0000236	6.05e-06	3.90	0.000***
Index of avaiable income inequality	-0.0043333	0.0032183	-1.35	0.182
Work non-participation rate	0.0035778	0.0014365	2.49	0.015**
Index of overall enviromental conditions	0.0013285	0.0012712	1.05	0.299

Note: * is significant for 90%, ** for 95% and *** for 99%.

We tested also for the overall significance of the model trough an F test. The results of the test with F(4,88) degree of freedom give a result of 8.06 with a p-value exactly equal to zero, so the model (1) is overall statistically significant. Moreover, we have performed the following test F in order to evaluate the right selection about fixed effect model instead of a pooled OLS.

Suppose to consider the pooled OLS as follow:

$$y_{i,t} = \alpha_i + \beta' X_{i,t} + v_{i,t}$$

and its alternative fixed effect model as:

$$y_{i,t} = \alpha_i + \beta' X_{i,t} + u_i + v_{i,t}$$

Testing for the presence of fixed effect means to consider the hypothesis:

$$H_0: u_i = 0, \qquad H_1: u_i \neq 0, \qquad i = 1, \dots, N$$

The p-value of this test is 0.0247, so for a 95% of confidence we can reject the pooled structure, assuming that the fixed effects are to be assumed for this panel. For the model (1) only two variables over four are statistically significant, that are the net average available income and the work non-participation rate. In particular the impact of the work non-participation rate is higher than the net average available income and the two variables have the same sign impact on GDP growth

rate. As we can see in the Tab. 2, the environmental conditions and the inequality in available income are not relevant in determining economic growth. So, the decision to monitor these two indicators it is fine, because them don't affect the GDP growth rate and are, at the same time, very important in order to understand the sustainability of a Country. However, the Italian Government, with the Committee for the BES indicators, have selected 12 indicators to monitor within the following DEF's documents. For this reason, we have performed a regression model with 12 independent variables that are all the BES indicators considered. This approach is very relevant because also the significance of the two indicators showed in Tab. 2 can be not valid more if we consider also other more independent variables. In fact, regressing the following model:

$$GDPgrowth_{i,t} = \beta_0 + Net\ average\ avaiable\ income_{i,t}\beta_1 + \\ + Index\ of\ avaiable\ income\ inequality_{i,t}\beta_2 + Poverty\ risk_{i,t}\beta_3 + \\ + Life\ expentancy_{i,t}\beta_4 + Overweight_{i,t}\beta_5 + \\ + Early\ exit\ from\ the\ education\ system_{i,t}\beta_6 + Work\ non\ participation\ rate_{i,t}\beta_7 + \\ + Woman\ employment\ ratio_{i,t}\beta_8 + Predatory\ crime\ index_{i,t}\beta_9 + \\ + Justice\ efficency\ index_{i,t}\beta_{10} + Index\ of\ overall\ enviromental\ condition_{i,t}\beta_{11} + \\ + Index\ of\ illegal\ construction_{i,t}\beta_{12} + \varepsilon_{i,t} \quad (2)$$

We obtain the results in Tab. 3. Also for the model (2) we have tested for the overall significance of the model trough an F test. The results of the test with F(12,80) degree of freedom give a result of 6.11 with a p-value exactly equal to zero, so the model (2) is overall statistically significant. Moreover, we have performed the same test F of the model (1) in order to evaluate the right selection about fixed effect model instead of a pooled OLS.

Table 3 – *Results of the regression model (2).*

GDP	Coeff.	St. Error	t	p-value
_cons	-0.1951661	0.6671883	-0.29	0.771
Net average avaiable income	7.40e-06	7.62e-06	0.97	0.335
Index of avaiable income inequality	-0.0052082	0.0034033	-1.53	0.130
Poverty Risk	0.022524	0.0011035	2.04	0.045**
Life expectancy	-0.0024263	0.0087133	-0.28	0.781
Overweight	0.0001047	0.00119	0.09	0.930
Early exit from the education system	-0.0021483	0.0013297	-1.62	0.110
Work non-participation rate	0.0014816	0.0015177	0.98	0.332
Woman employment ratio	0.000247	0.0003923	0.63	0.531
Predatory crime index	-0.0000876	0.0008119	-0.11	0.914
Justice efficency index	0.0001204	0.0000556	2.17	0.033**
Index of overall environmental conditions	0.0014799	0.0013671	1.08	0.282
Index of illegal constructions	0.0010796	0.0003966	2.72	0.008***

Note: * is significant for 90%, ** for 95% and *** for 99%.

The p-value of this test is 0.0187, so for a 95% of confidence we can reject the pooled structure, assuming that the fixed effects are to be assumed for this panel too. For the model (2) we find still significance problem about estimate parameters in the regression. Indeed only 3 over 12 indicators show a statistically significant relationship with the GDP growth rate. In particular, some indicator that were significant in the model (1), now are not significant anymore: for example, the net average available income doesn't explain any effect on GDP and the same happen with the work non-participation rate, which is not significant anymore.

The index of overall environmental conditions is still not significant, as the income inequality. In particular, these two last mentioned indicators are very important to explain the sustainability of a society, taking into account for the quality of the environment and the inequality, both linked with intergenerational dimension of sustainability. The evidence about the not significance of these two indicators confirms that the GDP is not a good proxy in order to measure the sustainability of a Country. Expect to poverty risk, justice efficiency and illegal constructions indexes, all the other indicators are not significant, proving what we said about the GDP as measure of sustainability. In particular, all the statistically significant indicators, have the same positive impact in affecting GDP growth rate. Indeed, the results show that increasing the rate of early school leaving tends to decrease the rate of GDP growth, while both the illegal construction and the efficiency of justice tend to increase economic growth. The main result is, however, the right selection about the indicators by the Committee for BES indicators. Indeed, because most of them have not a relationship with GDP it is very important to monitor them, assuming that they impact directly not only on sustainability but also on the happiness of the population.

5. Conclusions

In this study we pointed out that many indicators of sustainable well-being do not have a direct impact on GDP even if they impact on people's quality of life and their happiness. In fact, our results show that there is not a necessary relationship between GDP and sustainability and that the economists, sociologists and even statisticians that have addressed the issue of the limits of GDP as a measure of well-being had right. Surely a certain dimension of sustainability impacts GDP on different mechanisms and this is an undeniable fact that also emerges from our results. However, many important indicators such as the predatory crime index, life expectancy and inequality do not have a direct impact on GDP growth rate and don't taking into account these measures is certainly a mistake that developed Country as Italy cannot do. However, the significance of judicial efficiency and

illegal construction is also very interesting. Higher judicial efficiency and less bureaucracy are elements that are in some ways driving economic growth and it would also be interesting to make a comparison in terms of economic growth differentials between countries characterized by greater efficiency of the legal system compared to countries with less efficiency in this respect.

In general, from the point of view of the Italian regions it is clear that more efficient regions under the aspect of the judiciary over time meet higher economic growth. Another element worthy of attention is the one related to illegal constructions. Statistically, the analysis carried out in this paper shows that a higher rate of abusiveness leads to greater economic growth, attributing a fairly important role to the hidden economy in general. If we ask ourselves what the impact of the hidden economy is, by taking illegalism as a part of this much larger basket of voices, we can only answer that this give benefits to economic growth. Nevertheless, in this regard, other problems relating to the tax issue are created, as well as ethics. Finally, we could also ask ourselves how many these phenomena affect and in what way on the happiness of people.

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SUMMARY

Do sustainable well-being indicators affect GDP? Evidence from a longitudinal study in Italy based on BES approach

Sustainable development is a relatively recent approach to economic growth measure, which has the goal of measuring the standards of living in a more comprehensive way. Following this approach, the GDP is not the only right measure of economic growth and, for this reason, several Institutions (as IMF and OECD) have developed the concept of sustainable well-being, measured trough some other indicators in addition to the GDP. From Italy is coming a new approach in sustainable well-being measuring, called *Benessere Equo e Sostenibile* (BES). This project, proposed by ISTAT and CNEL, started in the 2013 and contains 12 dimensions of sustainable well-being which are examined in the paper. Several are the papers which have studied the relationship between GDP and sustainable indicators, in order to explain the impact on the economic growth.

However, no studies are referred to the Italian approach in well-being measuring. The aim of this paper is to study the impact of BES indicators in determining the economic growth of Italian regions. This paper uses a longitudinal study to assess these dynamics, considering the data from 2013 to today for all the Italian regions. The results show that most of BES indicator don't affect significantly GDP and for this reason their monitoring is still more important for sustainable purposes.

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LA POPOLAZIONE ITALIANA E LA COMFORT ZONE: CALCOLO DI UN INDICE COMPOSITO ATTRAVERSO LE DIMENSIONI DEL BES

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1. Introduzione

Il presente paper si propone di illustrare, definire e misurare attraverso tecniche di calcolo statistiche uno status studiato e descritto nell'ambito della psicologia comportamentale definito 'Comfort Zone' con espressione mediata da teorie e saggi di matrice americana, ovverosia, 'una condizione nella quale una persona opera in uno stato neutro, senza ansia, utilizzando un numero limitato di comportamenti per garantire un livello costante di prestazioni, di solito senza un senso di rischio'[1]. L'obiettivo perseguito è la definizione e il calcolo di un nuovo indicatore composito, che basandosi su un modello teorico costruito su un numero di indicatori provenienti dalle dimensioni del Benessere Economico e Sociale (BES) forniti da Istat, si prefigge di fornire una misura di quanto nelle Regioni Italiane sussistano le condizioni sociali, economiche, relazionali, ambientali, reddituali per uscire dalla *Comfort Zone*. L'approccio utilizzato è interdisciplinare e multidimensionale: si analizzano teorie comportamentali e sociali, utilizzando domini diversificati e scelti in modo coerente all'obiettivo, si applicano gli strumenti statistici più idonei per la definizione del nuovo indice composito, denominato Indice di *Comfort Zone* o, in breve, ICZ.

1 Dalla definizione di Alasdair White 'The comfort zone is a behavioural state within which a person operates in an anxiety-neutral condition, using a limited set of behaviours to deliver a steady level of performance, usually without a sense of risk' (White, 2008, p.3).

2. Il progetto

2.1. Il framework teorico

La *Comfort Zone*, in italiano 'zona di comfort', è costituita da tutte quelle situazioni che formano la cosiddetta routine, una 'bolla ambientale' nella quale l'individuo permane affinché tutto continui ad essere uguale a prima.

L'idea della Comfort Zone nasce da un esperimento del 1908 intrapreso in psicologia da Robert M. Yerkes e John D. Dodson[2]. I due scienziati scoprono che la stimolazione effettuata su alcuni topi ne migliorava la performance solo fino ad un certo punto, dopo il quale l'eccesso di stress provocava una reazione opposta e deteriorante i livelli della prestazione delle cavie. In sostanza, si produceva quello stato che è oggi conosciuto anche come "ansia ottimale", uno spazio in cui i nostri livelli di stress sono leggermente superiori alla norma e, per questo, migliorativi della nostra performance; una sorta di 'adrenalina' con effetti assolutamente ripaganti. Nel 1953 alcuni ricercatori[3] hanno evidenziato una stretta correlazione fra motivazione e performance; un loro corretto bilanciamento determina una aspettativa di successo pari al 50%, dopo il quale, pur aumentando l'aspettativa, avviene un calo di motivazione. Nel 1995 Carnall[4] stabilisce una correlazione diretta fra la coscienza di sé e la performance che cresce con lo stress fino a raggiungere un determinato livello, dopo il quale, essa decresce fino a raggiungere un livello in cui il comportamento può diventare volatile e la performance può andare in caduta libera. Nel contempo l'aumento della performance influisce positivamente nei confronti dell'ansietà che pone l'individuo in uno stato di eccitazione che deteriora la performance in una cosiddetta 'zona di pericolo'. Esiste, quindi, una zona chiamata *Optimal Performance Zone* nella quale gli *skills* sono accresciuti e diventano compatibili con il livello di ansietà e consentono al soggetto un elevato livello di performance e l'approdo ad una nuova e più estesa *Comfort Zone*. Il processo può considerarsi iterativo[5] e personale; ogni soggetto, infatti, ha il suo confine: non esiste una modalità unica per tutti, ma le condizioni in cui il miglioramento avviene sono peculiari in relazione al contesto in cui si vive e alla situazione del soggetto in esame. L'accezione della *Comfort Zone* è negativa, a dispetto di una denominazione che potrebbe trarre in inganno, in quanto non abbandonare la zona di comfort significa rinunciare alla crescita rimanendo

2 Dagli esperimenti dell'Università di Psicologia di Harvard descritti in Yerkes and Dodson (1908).
3 McClelland, Atkinson, Clark, Lowell (1953).
4 Carnall (1995)
5 Si può intraprendere un percorso di progressivo miglioramento in cui il confine della *Comfort Zone* viene via spostato

sopraffatti dalla insicurezza, che si alimenta attraverso la cosiddetta '*ruminazione'* [6] e pianificazione di ipotesi che non si ha il coraggio di trasformare in realtà. Mettersi alla prova consente di far entrare in gioco le cosiddette *soft skills*[7] che sono il fattore chiave per agire in armonia tra la competenza tecnica e competenza emozionale[8] e in integrità con se stessi e il mondo circostante; sugli *skills*, già in possesso dell'individuo, si può far leva per consentire di uscire fuori dal 'nido di sicurezze' costruito attorno allo stile comportamentale di ognuno.

Il *framework* di riferimento descritto dal presente lavoro analizza le condizioni che consentono la fuoriuscita dalla *Comfort Zon*e sulla base di un modello interdisciplinare che tiene conto sia delle precedenti riflessioni di natura psicologico-comportamentale e sociale, sia di aspetti legati alle condizioni di benessere economico sociale che meglio favoriscono l'attitudine alla crescita e al cambiamento evolutivo e migliorativo delle proprie condizioni individuali e collettive. E' dunque necessario individuare fra le dimensioni del BES[9], dopo una attenta analisi dei componenti costitutivi che spaziano da elementi di natura soggettiva (percezione di insicurezza, precarietà, instabilità e sfiducia) che collettiva (occupazione, istruzione, degrado ambientale, relazioni sociali), quali siano quelle che meglio caratterizzino le condizioni ambientali, sociali, reddituali, relazionali e attraverso strategie di sintesi appropriate, tali da far convergere un fenomeno multidimensionale su una singola misura sintetica che li possa rappresentare tutti considerando gli apporti di ciascuno di essi alla misura ottenuta.

Il paradigma di riferimento per la scelta delle dimensioni e dei relativi indicatori si basa sulla relazione fra la cosiddetta 'Piramide dei bisogni' di Maslow[10] e, in controluce, le considerazioni comportamentali legate alla definizione della *Comfort Zone* di Alasdair White. La decisione di considerare un determinato indicatore nel calcolo dell'indice deriva dunque dalla rispondenza di quelli che sono i fattori che soddisfino in un ordine che va dal basso verso il vertice della piramide a partire dai

[6] Hocksema (1991) definiva la ruminazione come uno stile di pensiero caratterizzato da immagini negative e pessimistiche che riguardano eventi del passato. I ruminatori mentali tendono a interrogarsi soprattutto sul perché tali eventi si sono verificati proprio a loro.

[7] La soft skills sono le competenze trasversali. Ovvero competenze cognitive, emotive-relazionali e realizzative che ci consentono di affrontare in maniera equilibrata e flessibile i rapidi cambiamenti che caratterizzano la nostra vita quotidiana e lavorativa. Tali skills rappresentano l'insieme delle competenze che vanno oltre la preparazione specialistica necessaria in qualsiasi settore. Esse aiutano a gestire situazioni impreviste e di stress mettendoci in relazione 'armoniosa' con noi stessi, con il nostro 'sapere tecnico' e con gli altri.

[8] Nell'opera di Daniel Goleman, denominata 'Emotional Intelligence' del 1995 si afferma che la conoscenza di sé, la persistenza e l'empatia vanno a costituire l'intelligenza emozionale, tuttavia un tempo sottovalutate, ignorate o non considerate come elemento rilevante nel computo del noto ma ridimensionato *testing* del quoziente di intelligenza (QI)

[9] Il BES è l'indice di Benessere Economico e Sociale predisposto dall'Istat e Cnel per valutare il progresso della società dal punto di vista economico, sociale, ambientale tenendo conto anche di misure di disuguaglianza e sostenibilità

[10] Maslow (1973).

bisogni primari, fisiologici, legati alle esigenze naturali e primarie (sostentamento), i bisogni di sicurezza che spingono a ricercare protezione e contatto. A seguire si trova il bisogno di amore e appartenenza, quindi alle relazioni tese a incrementare rapporti di natura amicale, sessuale, altruistiche per assicurarci una presenza consolidata nel mondo sociale, il bisogno di riconoscimento e stima, che si esplicita come il bisogno di essere riconosciuti per ciò che siamo e facciamo, infine il bisogno di autorealizzazione in cui ci si sente di poter esprimere tutta la propria personalità nell'ambito sociale in cui si vive. Gli indicatori sono selezionati in relazione alla rispondenza a quanto essi possano influire sulla spinta ad esplorare i confini della propria *Comfort Zone* con un approccio soggettivo secondo il quale l'individuo, dopo aver assolto i bisogni primari e materiali, può evolversi verso una propria realizzazione e quindi mettersi alla prova dal punto di vista personale e sociale. La scelta degli indicatori è un momento fondamentale della ricerca in quanto essi rappresentano, dal punto di vista operativo l'espressione delle assunzioni teoriche appena definite (Delvecchio, 1995). Gli indicatori scelti devono essere tra di loro non sostituibili[11], ossia non deve essere consentita, dal punto di vista teorico e della rilevanza degli stessi, un'operazione di compensazione fra essi; devono essere anche disponibili nel tempo e nello spazio, ovvero valorizzati per tutte le regioni nell'arco temporale di riferimento e non correlati (l'informazione non deve 'sovrapporsi'). Il dominio di riferimento dell'applicazione è costituito dalle 20 regioni italiane estratte dall'Appendice Statistica messa a disposizione dal BES 2016 dell'Istituto Nazionale di Statistica (Istat). Per l'obiettivo prescelto si ritiene pertinente dapprima effettuare l'analisi dei dati in un periodo di tempo contiguo (dal 2012 al 2014) e, successivamente, in un periodo di tempo distanziato (2005, 2010, 2014) al fine di interpretare il fenomeno con una maggiore e diversa sensibilità utilizzando le due proiezioni temporali. Il fenomeno analizzato negli anni consente di capire come e quanto si evolvano le condizioni di fuoriuscita dalla *Comfort Zone* nelle regioni italiane.

Eventuali cambiamenti riscontrati portano a considerazioni relative a quali fattori possano influenzare episodi di transizione o, al contrario, a quelli che determinano una condizione di stabilità nelle condizioni di vita della popolazione italiana.

L'ICZ, in qualità di indicatore di benessere economico e sociale, viene interpretato, dopo i dovuti calcoli, in ottica positiva, in modo da individuare siano i fattori che consentano di oltrepassare la propria zona di sicurezza sviluppando nuovi schemi positivi e funzionali per il benessere individuale e collettivo.

[11] La non sostituibilità è una condizione assolutamente necessaria al fine di misurare il fenomeno in oggetto. Si veda Mazziotta e Pareto (2015).

2.2. Il procedimento di calcolo e di sintesi dell'indicatore ICZ

Nella matrice dati costruita sugli indicatori selezionati non devono esserci dati mancanti e deve essere specificata la polarità, ovvero se l'indicatore sia concorde con il verso dell'indice. Pertanto, gli indicatori di connotazione negativa sono concordi all'indice, in caso di connotazione positiva essi devono essere invertiti con opportuni calcoli algebrici per utilizzarli nel modo corretto e concorde nella misurazione dell'indice. Sugli indicatori viene effettuata una standardizzazione finalizzata alla depurazione delle unità di misura specifiche in modo che essi siano omogenei ed aggregabili. L'aggregazione è una tecnica adottata per ridurre la molteplicità degli indicatori che avviene effettuando il calcolo della media aritmetica con una 'correzione' attraverso un coefficiente di penalità, che dipende, per ciascuna unità, dalla variabilità degli indicatori rispetto al valor medio ("variabilità orizzontale"). La variabilità è misurata attraverso il coefficiente di variazione che consente di penalizzare il punteggio delle unità le quali, a parità di media aritmetica, presentano un maggiore squilibrio tra i valori degli indicatori (metodo MPI, ovvero Mazziotta-Pareto-Index). La penalità viene sommata o sottratta a seconda del tipo di fenomeno studiato; nel caso dell'ICZ che è fenomeno negativo, essa viene sommata. Andando nel dettaglio, ciascun indicatore viene trasformato in una variabile standardizzata con media pari a 100 e scarto quadratico medio pari a 10, in modo tale che i loro valori siano compresi nell'intervallo [70,130][12]. Gli indicatori sono cosi 'liberati' dalla loro variabilità e dalla loro unità di misura. Più precisamente, l'indice di sintesi è ottenuto applicando una variante dell'MPI denominata AMPI, Adjusted MPI (Mazziotta e Pareto, 2016), il cui metodo di normalizzazione dei dati, al fine di consentire confronti assoluti nel tempo, si basa sul re-scaling degli indicatori elementari rispetto a due *goalposts*, cioè un massimo e un minimo che rappresentano un campo di variazione di ogni indicatore selezionato per tutto il periodo considerato. Omettendo la formula utilizzata in questa sede, si precisa che l'AMPI indica come si colloca ciascuna unità rispetto ai due estremi considerati[13].

[12] Intervallo ottenuto in base al teorema di Bienaymè-Cebycev

13 Il procedimento di sintesi si avvale dell'utilizzo del software COMIC, realizzato da ISTAT su piattaforma SAS. COMIC consente di calcolare l'indice sintetico applicando, fra gli altri, il metodo AMPI e fornisce una reportistica in formato grafico ed excel che si presta alle ulteriori considerazioni in formato cartografico e in formato tabellare.

3. Le dimensioni e indicatori elementari selezionati

Le dimensioni selezionate e relativi indicatori elementari estratti dal BES e il motivo della loro scelta sono indicati nel seguito e la loro polarità rispetto al fenomeno considerato.

Relazioni sociali: il grado di soddisfazione delle proprie conoscenze e relazioni interpersonali incrementa la fiducia nel prossimo e nella società, mostrando un atteggiamento di accoglimento ed apertura che migliori la propria area di vivibilità. La polarità è discorde.

Sicurezza: il senso di vulnerabilità e insicurezza nei confronti del posto in cui si vive tende a scoraggiare la fuoriuscita dalla Comfort Zone. E' fondamentale sentirsi protetti, liberi di potersi muovere senza condizionamenti o timori non limitandosi nel migliorare la propria qualità di vita e lo sviluppo e progresso del territorio. La polarità è concorde.

Lavoro (e conciliazione tempi di vita): i dati quantitativi relativi alla reale occupazione e la redditività, nonché quelli qualitativi che esprimono la qualità del tempo disponibile per attività non lavorative provocano un effetto sulla disponibilità al cambiamento e all'uscita dal proprio ambito di esperienze consolidate e legate alla prassi verso quelle nuove ed inesplorate. Al contrario, in mancanza di una occupazione ci si predispone meno su fronti diversi dall'ordinario in quanto le energie e le risorse sono impiegate per la risoluzione di problematiche essenziali e basilari, con scarsa attitudine alla ricerca di nuove esperienze e stimoli. Alcuni indicatori sono concordi, altri sono discordi con il fenomeno analizzato.

Benessere economico: contare sul proprio lavoro e reddito consente di superare le problematiche di prima sussistenza, in presenza delle quali verrebbe meno la possibilità di allargare i propri orizzonti. Reddito, ricchezza, capacità di consumo, situazione abitativa costituiscono le basi da cui partire per avere prestazioni al di fuori della propria zona di confidenza. La polarità è discorde.

Benessere soggettivo: la percezione del benessere deriva da un insieme di fattori che caratterizzano il benessere oggettivo, il cui riverbero determina le condizioni che consentono uno stile di vita e comportamentale sempre più soddisfacente. La dimensione è discorde rispetto al fenomeno considerato.

Istruzione: il grado di alfabetizzazione e i livelli di istruzione più alti motivano l'esigenza di sviluppare e soddisfare nuovi bisogni e sperimentazioni al di fuori della propria sfera di competenze, che in questa ottica, tendono ad accrescersi. La dimensione è concorde al fenomeno considerato.

Tabella 1 –*Dimensioni e indicatori elementari (dati per regione).*

Dimensione	Indicatori	Descrizione	Verso
Istruzione	IS02	Persone di 25-64 anni che hanno completato almeno la scuola secondaria di II Grado (scuola media superiore)	+
Istruzione	IS03	Persone di 30-34 anni che hanno conseguito un titolo universitario	-
Istruzione	IS06	Persone di 15-29 anni che non lavorano e non studiano	+
Istruzione	IS011	Persone di 6 anni e più che hanno praticato 3 o più attività culturali nei 12 mesi precedenti l'intervista	-
Lavoro	LC01	Tasso di occupazione della popolazione di 20-64 anni	-
Lavoro	LC04	Dipendenti a tempo determinato e collaboratori che hanno iniziato l'attuale lavoro da almeno 5 anni	-
Lavoro	LC05	Incidenza di lavoratori dipendenti con bassa paga	+
Lavoro	LC06	Incidenza di lavoratori sovraistruiti	-
Benessere Economico	BE01	Reddito medio	+
Benessere Economico	BE03	Persone a rischio di povertà	+
Benessere Economico	BE07	Persone che vivono in famiglie con grave deprivazione materiale	+
Benessere Economico	BE09	Indice di valutazione soggettiva di difficolta economica	+
Relazioni Sociali	RS01	Persone di 14 anni e più che si dichiarano molto soddisfatte delle relazioni familiari	-
Relazioni Sociali	RS02	Persone di 14 anni e più che si dichiarano molto soddisfatte delle relazioni amicali	-
Relazioni Sociali	RS04	Persone di 14 anni e più che negli ultimi 12 mesi hanno svolto almeno una attività di partecipazione sociale	-
Relazioni Sociali	RS06	Persone di 14 anni e più che negli ultimi 12 mesi hanno svolto attività gratuita per associazioni o gruppi di volontariato	-
Relazioni Sociali	RS09	Persone di 14 anni e più che ritengono che gran parte della gente sia degna di fiducia	-
Sicurezza	SI01	Tasso di omicidi	+
Sicurezza	SI02	Tasso di furti in abitazione	+

Benessere Soggettivo	BS01	Persone di 14 anni e più che hanno espresso un punteggio di soddisfazione per la vita tra 8 e 10	-
Benessere Soggettivo	BS02	Persone di 14 anni e più che si dichiarano molto o abbastanza soddisfatte per il tempo libero	-
Benessere Soggettivo	BS03	Persone di 14 anni e più che ritengono che la loro situazione migliorerà nei prossimi 5 anni	-

4. Principali risultati

La matrice dei dati con gli indicatori elementari riportata in Tabella 1 porta, a seguito dell'applicazione del procedimento di calcolo presentato nel paragrafo 2.1, ad una analisi dei risultati coerente con le rappresentazioni grafiche ottenibili dal BES.

Tabella 2 –*Risultati AMPI per l'ICZ in serie storica 2012-2014.*

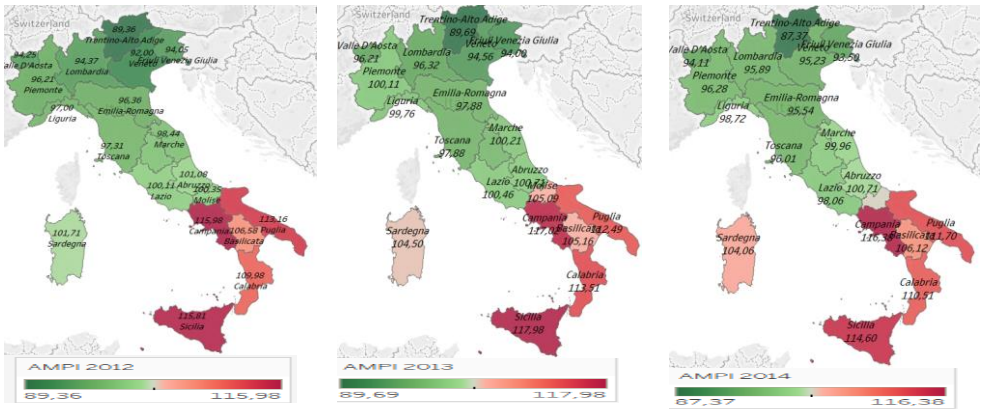
Regioni	AMPI 2012	AMPI 2013	AMPI 2014
Piemonte	96,214	100,597	96,28
Valle d'Aosta	94,249	96,205	94,11
Liguria	97	99,762	98,719
Lombardia	94,373	96,317	95,889
Trentino Alto Adige	89,362	89,685	87,373
Veneto	91,999	94,562	95,227
Friuli-Venezia Giulia	94,054	93,996	93,5
Emilia-Romagna	96,364	98,045	95,54
Toscana	97,313	97,881	96,006
Umbria	98,677	98,68	98,547
Marche	98,443	100,105	99,956
Lazio	100,106	100,458	98,058
Abruzzo	101,08	100,706	100,706
Molise	100,345	105,085	102,082
Campania	115,976	117,022	116,384
Puglia	113,157	112,491	111,704
Basilicata	106,58	105,156	106,12
Calabria	109,978	113,512	110,511
Sicilia	115,812	117,975	114,595
Sardegna	101,712	104,498	104,056
ITALIA	**100**	**101,652**	**100,088**

Indice ICZ calcolato con il software COMIC e metodo AMPI sugli indicatori selezionati nel tempo (anni 2012-2013-2014).

Leggendo i risultati in ottica di uscita dalla *Comfort Zone*, il valore più alto è quello che denota la maggiore difficoltà a superare la linea di confine della zona di sicurezza. Se si ribaltano i risultati, il Trentino emerge con posizione privilegiata, mentre la Campania e nel 2014 la Sicilia come quelle dove le condizioni sono meno favorevoli.

I colori utilizzati nei cartogrammi esprimono in maniera inequivocabile una sostanziale immobilità delle Regioni Italiane nell'arco dei tre anni; anzi, la media italiana denuncia un peggioramento nel corso del tempo in quanto il valore complessivo aumenta.

Figura 1–*Cartogrammi dell'ICZ nel Triennio 2012-2013-2014*



L'Italia è 'divisa in due', un Paese che viaggia a due velocità diverse: da un lato il Nord, poi il Sud e le Isole. Il Centro presenta una situazione ibrida. Al Sud, per esempio, si avverte maggiore insicurezza nelle condizioni di vita anche in ragione del fenomeno di micro e macro-criminalità, dove è più alto il tasso di disoccupazione, dove le relazioni sociali contano (la famiglia è un nucleo fondante da cui partire per qualsiasi attività da svolgere all'esterno del proprio ambito), ma mancano condizioni stimolanti per nuove sperimentazioni in quanto ci si trova ai primi strati della piramide dei bisogni. La situazione a distanza di 4 o 5[14] anni riporta le medesime considerazioni, si deduce, anzi, che l'Italia nel 2005[15] deteneva in generale condizioni migliori nell'ottica della fuoriuscita dalla *Comfort Zone*.

[14] Gli intervalli non sono equidistanti a causa dell'indisponibilità dei dati per alcuni indicatori

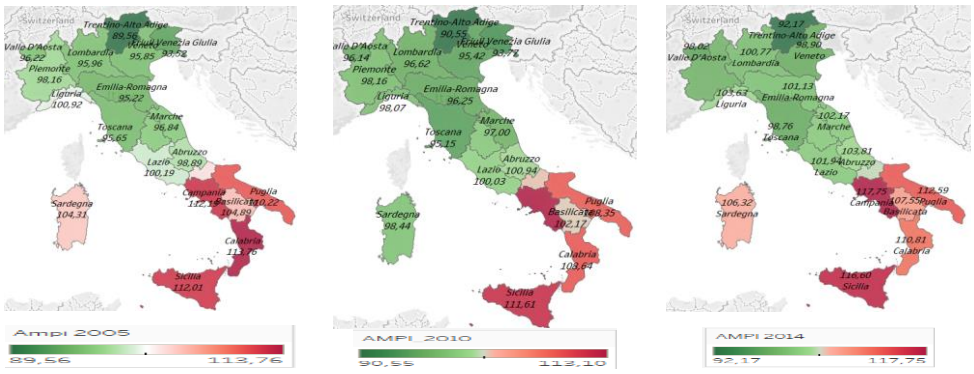
[15] Gli indicatori selezionati sono in misura leggermente ridotta per via della disponibilità completa dei dati nel 2005

Tabella 3–*Risultati AMPI per l'ICZ in serie storica 2005-2010-2014*

Regioni	Rango 2005	AMPI 2005	Rango 2010	AMPI 2010	Rango 2014	AMPI 2014
Piemonte	11	98,159	11	98,159	15	99,668
Valle	14	96,224	16	96,142	18	98,020
Liguria	8	100,91	12	98,072	9	103,632
Lombardia	15	95,964	14	96,615	14	100,769
Trentino	20	89,562	20	90,545	20	92,165
Veneto	16	95,852	17	95,424	16	98,902
Friuli-	19	93,524	19	93,769	19	96,981
Emilia-	18	95,222	15	96,254	13	101,132
Toscana	17	95,654	18	95,146	17	98,764
Umbria	12	96,898	9	99,136	11	102,002
Marche	13	96,835	13	97,002	10	102,174
Lazio	9	100,18	8	100,030	12	101,938
Abruzzo	10	98,893	7	100,938	8	103,810
Molise	7	102,92	5	102,363	7	104,681
Campania	2	112,18	1	113,101	1	117,751
Puglia	4	110,22	4	108,350	3	112,586
Basilicata	5	104,89	6	102,172	5	107,553
Calabria	1	113,75	3	108,643	4	110,807
Sicilia	3	112,00	2	111,608	2	116,597
Sardegna	6	104,30	10	98,444	6	106,316
ITALIA		**100,00**		**99,713**		**103,429**

Indice ICZ calcolato con il software COMIC e metodo AMPI sugli indicatori selezionati nel tempo (anni 2005-2010-2014).

Figura 2–*Cartogrammi dell'ICZ nel Triennio 2005-2010-2014*



5. Conclusioni

La Teoria della *Comfort Zone* si può applicare non solo all'individuo, ma anche alle relazioni e agli insiemi di individui organizzati in modo strutturato o no.

Gli indicatori selezionati e rappresentati dall'ICZ forniscono un quadro attendibile della situazione italiana per quanto riguarda la tendenza al cambiamento, o meglio, ad una sostanziale situazione di staticità.

I calcoli portano a tradurre un comportamento su un orizzonte numerico e analizzato nei suoi componenti costitutivi.

L'ambizione sottesa all'idea presentata è che si possano modificare le attitudini e la *capabilities*[16] consolidate nel tempo come alla guida di una console di comando dove ogni tassello che muta possa avere effetti sensibili sulle condizioni di vita che inneschino un cambiamento sociale nell'ottica del benessere collettivo.

Gli strumenti di calcolo utilizzati, estremamente validi per le analisi nel tempo, si prestano in modo calzante all'obiettivo del paper che vuole scandagliare cambiamenti seppur minimi negli stili di vita e di comportamento.

La prospettiva da perseguire è quella di raffinare la ricerca in ambiti territoriali più ristretti, ad esempio a livello provinciale, e inserendo nuove dimensioni (si pensi alla dimensione di Ricerca e Innovazione Tecnologica), in modo da ottenere ingredienti maggiormente ricchi di informazioni per il calcolo dell'indice.

Ci si augura che i *policy maker*, possedendo un nuovo meccanismo di lettura del benessere economico e sociale, possano mettere in atto politiche di welfare, occupazione, miglioramento delle relazioni, integrazione delle popolazioni

immigrate, scuola attiva e partecipativa, potenziamento del terzo settore, che sono i fermenti vitali alla base del calcolo dell'indice di *Comfort Zone*.

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16 Intesa nel significato da Martha Nussbaum: "modi di agire, fare ed essere, che costituiscono tipicamente la vita umana e la distinguono da altre forme di vita reali o possibili"

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SUMMARY

The Italian population and the Comfort Zone: a composite indicator calculated through the dimensions of BES

The aim of this work is to define a way to measure how much Italian Regions are ready to walk across a boundary of a Comfort Zone, a place where people and society stay to be confident on all the aspects of daily and civil life. The approach is multidimensional and interdisciplinary: starting from the psychological definition of Comfort Zone, mentioning the Maslow pyramid needs, the application is based on the well-being dimensions reported by ISTAT (BES 2016), properly selected for the purpose to demonstrate if there are in Italy social, economic, relational, secure conditions to enhancing life in new experiences and improve individual and collective performance. The combination among indicators taken from 6 dimensions of BES produces a new composite index, called Comfort Zone Index (ICZ).

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CLASSIFYING HOUSEHOLDS BY SOCIO-ECONOMIC VULNERABILITY: AN APPLICATION TO AN ITALIAN MUNICIPALITY[1]

Daniela Bonardo, Sara Casacci, Adriano Pareto, Marco Dionisio Terribili

1. Introduction

The main objective of this work is to propose a method for classifying households in order to study their social and economic conditions at low territorial detail. The work has been conducted within the ARCHIMEDE (Integrated archives of economic and demographic microdata) project of the Italian National Institute of Statistics (Garofalo 2014). The collection of microdata we used is produced from the integration of information contained in administrative sources, properly treated, to study the socio-economic situation of households in Italy. The integration of several sources (Municipal Population Registers, Tax Returns Register, Central Register of Pensioners, Social Security Archives, Social Security Benefits Register, Student Registers) allows not only an informational enrichment through the creation of new variables, but also an improvement of data quality. In fact, administrative data are collected for administrative purposes and may be not of good quality when used for statistical purposes. In this project, the integration has the goal of compiling better information than is possible when using the separate sources. In practical, a set of decision rules was designed in order to (a) correct for under-coverage or over-coverage of some target populations (e.g., income earners), (b) harmonize data under a single common denominator (e.g., correct classification of income) and (c) correct for measurement errors, resolving inconsistencies in data (e.g., correction of incorrect amount of income). Nonetheless, an accurate assessment of data quality is still needed and future work should concern a measure of the impact of the errors affecting administrative sources on the results. Despite these limitations, the information produced within the ARCHIMEDE project

[1] The paper is the result of the common work of the authors: in particular, D. Bonardo has written Sections 5 and 6, S. Casacci has written Sections 1 and 2, A. Pareto has written Section 3, and M. D. Terribili has written Section 4.

allows to expand significantly the territorial detail (municipal level) to which data are disseminated.

In this paper a vulnerability composite indicator was calculated for each household resident in a municipality, and a Cluster Analysis was performed to detect homogeneous groups of households, in order to check the consistency of the results. Vulnerability can be defined as "exposure to contingencies and stress, and difficulty in coping with them" (Chambers 1989). Data are referred to the Italian municipality of Modena, in 2012. Modena is a municipality of the Emilia-Romagna region, in the Northern Italy, counting 84,632 resident households.

Theoretical framework and selection of indicators are discussed in Section 2; whereas technical steps for constructing the composite indicator (normalization, aggregation and validation) are reported in Section 3. Cluster Analysis is described in Section 4 and results are commented in Section 5. Finally, conclusions are drawn in Section 6.

2. Role of assets in reducing vulnerability: theoretical framework and selected indicators

The notion of "vulnerability" is a very broad one, encompassing a multiplicity of meanings and approaches among the disciplines. As remarked above, it can be defined as exposure to negative events, and difficulty in coping with them. In its broadest sense, vulnerability refers to the situation of individuals, households, or communities who are exposed to potential harm from one or more risks. It also refers to the capability to face negative shocks. Differences in approaches to vulnerability among the disciplines can be explained by their tendency to focus on different components of risk, household responses to risk and welfare outcomes.

One of the approaches to vulnerability is the asset-based approach, which is based on economics terminology, but it is multidisciplinary. The new literature on asset-based approach has its genesis in Amartya Sen's entitlement approach. This approach was assimilated into the sociological/anthropological literature by the late 1980s and entitlements were extended to include social capital and other forms of intangible assets. One of major conceptual focus of this literature is the ability of households to manage risk through enhanced responses to risk, whereas the treatment of risk is mostly implicit. In asset-based analyses, households with more income and other assets are considered to be more resilient to welfare losses caused by risky events. Vulnerability, therefore, is strictly linked to asset ownership: the more assets people have, the less vulnerable they are; the greater the erosion of assets, the higher the level of insecurity (Moser and Holland 1997). Also the definition of vulnerability adopted by OECD focuses on assets: "a person (or

household) is vulnerable to future loss of well-being below some socially accepted norms if he or she lacks (or is strongly disadvantaged in the distribution of) assets which are crucial for resilience to risks" (Morrone et al. 2011).

In this work, according to OECD asset-based approach, we focused on the resources that households can draw upon to reduce vulnerability and strengthen their resilience to a range of different risks. Vulnerability is defined as insufficient capital held by households, provided that the different forms of capital (material and financial capital, instruction, etc.) are taken into account. The selection of assets is based on the consideration that in a developed country most people will never experience the grave privations commonly faced by the world's poorest populations. Vulnerability is a multidimensional concept and it should be represented under different points of view. For this reason, we selected a set of indicators grouped in the following dimensions, considered on literature as assets preventing from vulnerability (Freyssinet 2009):

1. Income: affecting the possibility of households to purchase goods and services, it determines their resilience from adverse events (job losses, long-term illness, etc.). In this dimension we also included indicators referring to the share of income earners and to the income concentration within the household. They represent proxies of the household asset management, with multiple earners with high income levels as the optimum strategy.
2. Work: this dimension detects the quantitative aspect of labour market participation. It allows to highlight situations at higher risk of poverty and social exclusion, underlining the effects of a low-intensity occupation.
3. Education: educational attainment is a proxy for human capital. A high level of education is positively correlated with high standards of living, possibility to find work, to have healthier lifestyles and more opportunities to find jobs in a less risky (OECD 2010; Miyamoto and Chevalier 2010).
4. Structure of the household: some family structure are more likely to experience poverty than others (Cancian and Reed 2002). Actually, this dimension does not constitute in itself an asset preventing from vulnerability. However, it was included in the analysis to better classify Italian households.
5. Disadvantage: this dimension detects the existence of conditions damaging individual and household well-being. The presence of household members holding of a retirement benefit for occupational diseases, accidents at work, etc. have an impact on life conditions, social relationships, opportunities and prospects of individuals and of their families.

The indicators used for the composite indicator construction (with the respective 'polarity', i.e., the sign of the relation between the indicator and the protection from vulnerability) and Cluster Analysis are listed in Table 1.

The selection of the indicators represents a compromise between the availability of information in the data sources (bottom-up approach) and the literature review. Note that X_5, X_8, X_9, X_{10} and X_{11} were excluded from the composite indicator[2], whereas they were included in the cluster analysis.

Table 1 – *List of individual indicators.*

Dimension	Indicators	Labels	Composite indicator	Polarity
Income	Household equivalised gross income (€)	X_1	Yes	+
	Share of income earners	X_2	Yes	+
	Income concentration within the household (Gini Index)	X_3	Yes	-
Work	Household work intensity	X_4	Yes	+
	Share of household members receiving an unemployment benefit	X_5	No	
Education	Share of years in education of household members	X_6	Yes	+
	Share of household members aged 18-26 not in tertiary education	X_7	Yes	-
Work and education	Share of household members aged 15-29 not in education or employment	X_8	No	
Structure of household	Share of household members aged 0-14	X_9	No	
	Share of household members aged 65+	X_{10}	No	
	Share of household members with foreign citizenship	X_{11}	No	
Disadvantage	Share of household members holding of a retirement benefit for occupational diseases, accidents at work, etc.	X_{12}	Yes	-

3. Constructing the vulnerability composite indicator

As is known, constructing a composite indicator is a complex procedure that requires the following main steps (OECD 2008, Mazziotta and Pareto 2017):

1. Defining the phenomenon to be measured. This step requires the definition of the model of measurement, in order to specify the relationship between the phenomenon to be measured (concept) and its measures (individual indicators). If causality is from the concept to individual indicators we have a reflective model; if causality is from individual indicators to the concept we have a formative model (Diamantopoulos et al. 2008).

[2] They were excluded because X_5 has not a well-defined polarity, X_8 does not represent a single dimension (it concerns both work and education) and X_9-X_{11} are auxiliary variables about the household structure.

2. Selecting a group of individual indicators. The selection is generally based on theory, empirical analysis, pragmatism or intuitive appeal. Ideally, indicators should be selected according to their relevance, analytical soundness, timeliness, accessibility and so on.
3. Normalizing the individual indicators. This step aims to make the indicators comparable, as they often have different measurement units and/or different polarities. Normalized indicators are calculated by transforming individual indicators into pure, dimensionless, numbers, with positive polarity. There are various methods of normalization, such as re-scaling (Min-Max), standardization (z-scores) and 'distance' from a reference (index numbers).
4. Aggregating the normalized indicators. It is the combination of all the components to form one or more composite indices (mathematical functions). This step requires the definition of the importance of each individual indicator (weighting system) and the identification of the technique (compensatory or non-compensatory) for summarizing the individual indicator values into a single number. Different aggregation methods can be used, such as additive, multiplicative and non-linear methods. Multivariate techniques as Principal Component Analysis are also often used.
5. Validating the composite index. Validation step aims to assess the robustness of the composite index, in terms of capacity to produce correct and stable measures, and its discriminant capacity.

In this work, a formative measurement model was adopted, since indicators such as education, income, and work are items that cause or form the latent variable of social vulnerability. The individual indicators were normalized to ensure that they were all 'bounded' (i.e., ranging between fixed values) and with positive polarity. For each indicator, higher normalized values represent greater protection from vulnerability, i.e., lower levels of vulnerability.

An exploratory Principal Components Analysis was performed to study the overall structure of the dataset, as suggested in OECD (2008). Results show that the correlations among the indicators are generally very low (Table 2) and that the information given by the individual indicators is not redundant (the 1st principal component accounts for about 30% of the total variance). This supports the theoretical choice of a formative model rather than the reflective one.

In order to select the aggregation method, a comparison among six alternative methods - *compensatory* and *non-compensatory* - was performed (Istat 2015). The following methods[3] were tested:

1. *Additive methods*. Arithmetic mean of re-scaled values in the range [0,1] (AMR); arithmetic mean of *z*-scores (AMZ).

[3] For a review of the methods, see Mazziotta and Pareto 2017.

2. *Multiplicative methods*. Jevons Index (JI), i.e., geometric mean of *index numbers*; geometric mean of re-scaled values in the range [1, 199] (GMR).
3. *Unbalance-adjusted functions*. Mazziotta-Pareto Index (MPI); Adjusted MPI (AMPI).

Table 2 – *Correlation matrix of individual indicators.*

Individual indicator	X_1	X_2	X_3	X_4	X_6	X_7	X_{12}
X_1	1.000	0.453	0.045	0.271	-0.142	-0.108	0.034
X_2	0.453	1.000	-0.509	-0.042	0.282	-0.111	0.156
X_3	0.045	-0.509	1.000	0.191	-0.242	0.147	-0.105
X_4	0.271	-0.042	0.191	1.000	-0.443	0.065	-0.226
X_6	-0.142	0.282	-0.242	-0.443	1.000	-0.076	0.272
X_7	-0.108	-0.111	0.147	0.065	-0.076	1.000	-0.065
X_{12}	0.034	0.156	-0.105	-0.226	0.272	-0.065	1.000

Frequency distributions of composite indicators show a certain similarity, except for JI and GMR (Figure 1). AMR, AMZ, MPI and AMPI have negatively skewed distributions, whereas JI presents a strong positive skewness, due to the multiplicative aggregation of index numbers that penalizes low values of individual indicators. GMR has a very irregular distribution due to the use of the geometric mean with a Min-Max normalization. In addition to the similarities between the frequencies distributions, the rank correlations among the composite indicators are very high, except for JI (Table 3).

Since different weighting systems imply different results, no attempt is made to explicitly weigh the individual indicators. Implicitly then the dimensions are not equally weighted, but each of them is 'weighted' proportionally to the number of individual indicators that represent it. This introduces an element of subjectivity, but one that appears manageable because it relates to the relative importance of different aspects of vulnerability.

Results of the Influence Analysis[4] indicate that JI and GMR produce a lack of balance between individual indicators (i.e., the removal of an individual indicator produces a strong variation in the household ranking). AMR and AMZ, by contrast, turn out to be the most robust composite indicators.

On the basis of this information, the AMR was used for constructing the Vulnerability Composite Indicator (VCI) because it represents a good trade-off between robustness and interpretability (*z*-scores are 'unbounded', i.e., they do not range between fixed values, and then AMZ is more difficult to interpret). This means that, while there are differences between the properties of different kinds of assets, what is important is the compensability of different types of assets: "low

[4] Influence Analysis is a particular case of Uncertainty Analysis where individual indicators are iteratively removed from the composite indicator in order to assess its robustness (Mazziotta and Pareto 2017).

levels of one type of asset do not necessarily mean that an individual or household is inherently vulnerable; it is the composition of the overall 'asset portfolio' that matters" (Morrone et al. 2001). So, for example, it is reasonable to suppose that a low work intensity can be offset by a high value of household income.

Figure 1 – *Frequency distribution of composite indicators.*

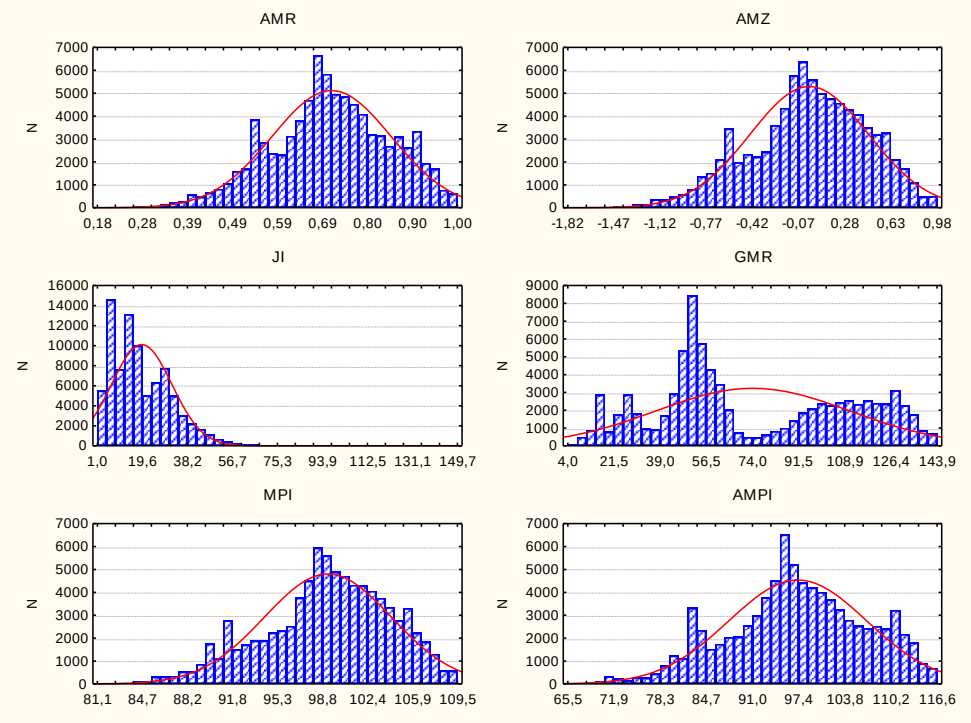


Table 3 – *Spearman correlation matrix of composite indicators.*

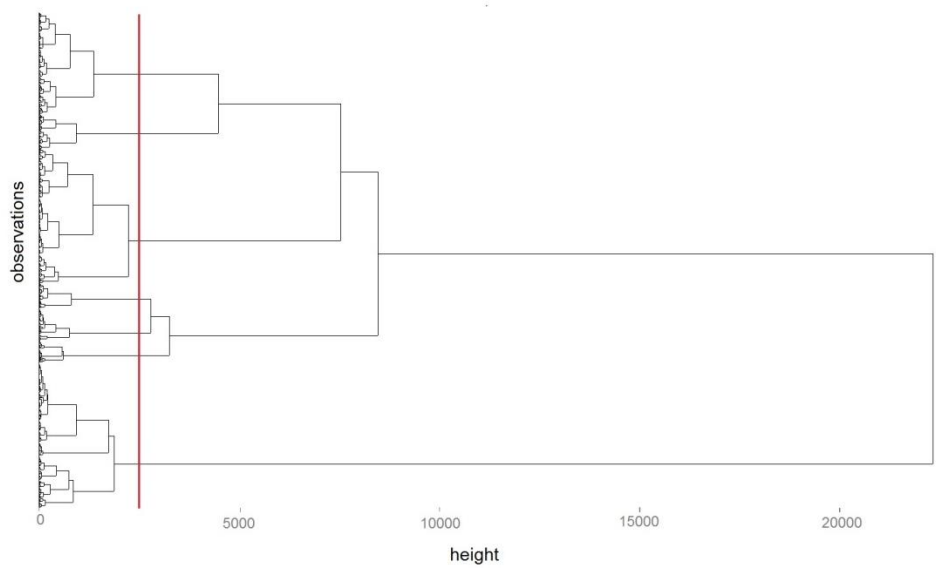
Composite indicator	AMR	AMZ	JI	GMR	MPI	AMPI
AMR	1.000	0.985	0.195	0.933	0.977	0.989
AMZ	0.985	1.000	0.160	0.906	0.996	0.982
JI	0.195	0.160	1.000	0.415	0.163	0.201
GMR	0.933	0.906	0.415	1.000	0.910	0.943
MPI	0.977	0.996	0.163	0.910	1.000	0.986
AMPI	0.989	0.982	0.201	0.943	0.986	1.000

4. Clustering households by vulnerability

Afterward the assignment of a vulnerability level to every household through the composite indicator, some multivariate techniques of clustering have been

applied to identify subpopulations or groups of units, as more homogeneous within, as more heterogeneous between each other. Our goal is to apply Cluster Analysis to point out distinct population segments sharing the same vulnerability level, based on the individual indicators used for constructing VCI and some other variables (Table 1). The clustering techniques are usually discerned in hierarchical and non-hierarchical. Several hierarchical clustering have been tested, by using two different distance functions (Euclidean and Manhattan distance) and three aggregation methods (Ward's method, complete linkage and average linkage). The choice of the number of clusters to be generated was made on the basis of our informational needs and of a graphical analysis of the resulting dendrograms (the output tree diagrams of the algorithm). Regarding the informational needs and the diagrams (in Figure 2 is shown an example), seven clusters have been pointed out, by pruning the dendrogram up to the red line. This solution represents a good compromise between a detailed clusters number and their within homogeneity.

Figure 2 – *Dendrogram of hierarchical clustering by Ward's method with Euclidean distance.*



Considering our informational needs, the established number of groups to generate and the high number of observations to cluster, a non-hierarchical method has been applied to point out, in a different way, seven clusters. So the clustering algorithm has been rerun by using the k-means method and exploiting the Euclidean distance function to aggregate the observations around the seven centroids, unobserved units representing the average position (in a m-dimensional

space, where m is the number of variables considered) of each group. These average positions are very important to define the distinct population segments, sharing the same condition about vulnerability. *K*-means method is quicker and more efficient than hierarchical methods, but it provides similar results. This is confirmed by the Chi-Square Test of Independence and also by the Cramer's V (Table 4). Null hypotheses of independence are all rejected (p-value<0.05) and Cramer's V values, ranging from 0 to 1, are in any case greater than 0.47. The aggregation method which gives the most similar partition is the Ward's method with Euclidean distance (Cramer's V=0.80), because both methods are based on the Sum of Squared Error (SSE). On the basis of these results, we classified households by *k*-means method, that is particularly able to find spherical clusters.

Table 4 – *Comparing 7-cluster partition of hierarchical methods with the one of k-means method*

Method	Distance	χ^2	p-value	Cramer's V
Ward	Manhattan	283,248.4	< 0.05	0.75
	Euclidean	324,305.0	< 0.05	0.80
Complete-linkage	Manhattan	187,649.3	< 0.05	0.61
	Euclidean	233,098.9	< 0.05	0.68
Average-linkage	Manhattan	153,493.2	< 0.05	0.55
	Euclidean	111,742.7	< 0.05	0.47

5. Results

The VCI for the households of Modena ranges from 0.18 (highest vulnerability level) to 1 (lowest vulnerability level). Overall, the degree of socio-economic vulnerability[5] is quite low: the distribution of the VCI is slightly negatively skewed with a mean of 0.71 and a standard deviation of 0.14. This result seems to be plausible, since Emilia-Romagna is a region with high levels of income and well-being. Cluster Analysis allows to detect specific groups of households in relation to their possession of asset, taking into account several socio-demographic characteristics (citizenship, structure of the households, age of members). One of the most interesting results of cluster analysis is that the elements of vulnerability often overlap. For each group of households, the median of VCI and other descriptive statistics were calculated, in order to assess the level of vulnerability (Table 5). The "Protected senior citizen" cluster is the largest, accounting for 26.8% of the total number of households. It is characterized by elderly people, perceiving a guaranteed income, with a medium-low level of vulnerability. Their

[5] Although a measurement of vulnerability should include the definition of a *cut-off* or *benchmark*, we did not choose a cut-off, since it should vary in different municipalities.

median degree of vulnerability is 0.67 since they lack in assets such as education and health. The "Well-to-do singles & couples" group (22%), is mostly composed by one-person households with both a high work intensity and a high income; this group has the lowest vulnerability risk (median=0.89). The "Leisure class" cluster (19.9%) is characterized by the presence of children, generally one income earner, high work intensity and low vulnerability risk (median=0.73). The "Scanty capital" cluster contains about nine thousand household (10.7% of the total) with low levels of education and lack of employment. This group presents a medium-high degree of vulnerability (median=0.66). Two clusters with different profiles are referred to foreigner households: the "At risk" cluster (7.1%), with high incidence of unemployed young people and low family income, and the one called "In gear" (6.9%), composed probably of long-term immigrants with high-intensity occupation. Whereas the "In gear" group is associated to a low exposure to vulnerability (median=0.80), the "At risk" one appears to be the most vulnerable (median=0.53). Lastly, the "Jobless" cluster (6.7%), which identifies households with children, is exposed to a greater risk of vulnerability (median=0.60) since adults are often unemployed.

Table 5 – *Absolute and percentage frequencies of clusters, and VCI statistics*.

Cluster	N	%	VCI			
			Min	Median	Max	Std dev
Protected senior citizen	22,662	26.8	0.34	0.67	0.86	0.08
Well-to-do singles & couples	18,611	22.0	0.61	0.89	1.00	0.06
Leisure class	16,812	19.9	0.41	0.73	0.90	0.08
Scanty capital	9,096	10.7	0.32	0.66	0.87	0.11
Foreigners at risk	5,998	7.1	0.18	0.53	0.77	0.09
Foreigners in gear	5,822	6.9	0.43	0.80	1.00	0.09
Jobless	5,631	6.7	0.21	0.60	0.84	0.12
Total	84,632	100.0	0.18	0.77	1.00	0.12

6. Conclusions: strengths and weaknesses

The main goal of this paper is to propose a combination of methods for classifying Italian households in relation to their socio-economic vulnerability, by using experimental microdata obtained from the treatment and integration of administrative sources. The core of the work is the construction of a composite indicator of vulnerability (VCI), by aggregating individual indicators concerning different dimensions (income, work, education and health) in order to assign a vulnerability level to every household. Measuring households' vulnerability by this approach has evident advantages, such as an one-dimensional representation of the phenomenon and an immediate interpretation and usability of data. However, the

reconstruction process of individual indicators in a composite indicator is complex in itself, since it needs a number of theoretically and methodologically oriented choices (e.g., variables used and indicators meaning, choice of the aggregation function) that have a significant impact on the final results. Furthermore, aggregation of the individual indicators implies a loss of information, as we are no more able to recognize the features of the vulnerable households. For this reason, a cluster analysis was conducted, trying to identify and characterize specific groups of households. The cluster analysis has highlighted distinct groups whose configurations in relation to socio-economic profiles and structure of households are fairly intuitive. Outcome of cluster analysis seems to be quite consistent with the results of the VCI, since the groups pointed out present different vulnerability levels and are able to discriminate among different types of households.

Turning to policy, the possibility of assessing the vulnerability degree of every Italian household (describing the size and characteristics of the vulnerable population) is a powerful tool for identifying the policy priorities required to reduce the incidence and intensity of vulnerability. Besides, the VCI is useful for analysis over time and among different groups or municipalities. Future work should concern the application of both methods on households of geographical areas with different characteristics, in order to verify the effectiveness of the choices made.

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SUMMARY

Classifying households by socio-economic vulnerability: an application to an Italian municipality

The measurement of the socio-economic vulnerability of communities and households, especially at a low territorial detail, has important implications both in terms of the analysis of well-being and in terms of policy. This paper reports the results of a work conducted for classifying households of an Italian municipality in relation to their socio-economic vulnerability. Data are referred to the Italian municipality of Modena, in 2012. Since vulnerability is a multidimensional concept, a composite indicator approach was followed. A Cluster Analysis was also performed in order to identify and characterize specific groups of households. The empirical evidence shows that the degree of socio-economic vulnerability of households is quite low and that the elements of vulnerability often overlap. Translated into operational practice, the proposed framework facilitates policy makers to suitably target the local level interventions and to define the hierarchy of priorities to endorse the well-being of households and communities.

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