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Multidimensional economic well-being. Is it measurable? The case of Lombardy

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Abstract

The definition and measurement of economic well-being is receiving growing attention, both in academic research and policy agenda, as a key issue to provide a solid basis for decision-making at all levels, both national and local. There is general agreement among economists and policy-makers about the necessity to go beyond GDP but the convergence towards a new and wider definition and measurement is far from being reached. This is why research and experiments that try to test different definitions and indicators can help, through empirical results, to the ongoing debate. This paper attempts to measure the multidimensional well-being of the Italian Region Lombardy, for the years 1995-2005, along the lines of the Index of Economic Well-Being (IEWB) proposed by the Centre for the Study of Living Standards (Osberg, 1985; Osberg and Sharpe, 2002, 2005).

The evolution of the index is aligned with that of per capita GDP from 1995 to 2001 but diverges in the following period because of the fall of regional per capita GDP and consumption in the period 2002-2005 and a contemporary strong growth of the health dimension and of the level of human capital stock (education).

JEL Classification: I31, I32, D63, D31.

Keywords: well-being, composite indicators, development.

1. Introduction

Well-being is a multidimensional phenomenon that involves different aspects of people's lives. Most of its dimensions are difficult to quantify and depend on subjective evaluations. This implies that there is neither a single, universal definition of well-being nor a unique method for its measurement. Multidimensionality makes the evaluation of well-being more difficult and requires a set of various indicators, giving rise to a number of theoretical, methodological and empirical problems. Nevertheless, the measurement of well-being is important for providing decision-making at all levels with a solid basis (Pulselli et al. 2006), and there is a growing body of literature on well-being indexes that combine economic, social and environmental issues in order to measure the quality of well-being. One of the most widely-used approaches is the composite indicators approach (Stiglitz Commission, 2008; OECD 2008b). Composite indicators aggregate elementary indexes to encompass several dimensions of well-being. On the one hand, they allow synthetic analysis to be made of the phenomenon; on the other, they can be broken down, enabling the analysis of the different components of well-being. Examples of composite indicators are: the Human Development Index (United Nations Development Program, UNDP), the Index of Economic Well-Being (Osberg and Sharpe, 1998, 2002), the Environmental Sustainability Index (ESI) and the Environmental Performance Index (EPI) (Estes et al., 2005), the Quality of Life Index (Diener, 1995). The Index of Economic Well-Being (IEWB) measures economic well-being as "command over resources" and it is based on four components: the level of effective per capita consumption, the accumulation of stocks of productive resources, income distribution and economic security.

Recently, several works have addressed the question of measuring progress and well-being in Italy at a sub-national level: see for example Mazziotta and Pareto (2009), Ciampalini et al. (2009), Rondinella and Segre (2009), Gismondi and Russo (2008), Pulselli et al. (2006), Ferrarini et al. (2001). Our study takes the IEWB as the basis for the construction of an index of economic well-being for the Lombardy region in Italy. It is important to measure the evolution of well-being at local level because local authorities are responsible for the development of social and economic infrastructures and for the definition of local policies (Ferrarini et al., 2001; Pulselli et al., 2006.). The construction of indexes that measure economic well-being reliably assists the monitoring of local development and the impact of policies.

We have slightly modified the IEWB with respect to the original version (Osberg and Sharpe, 2005) by adding health as a specific new dimension and measuring economic security only by employment security. We focus on the specific sub-components of the Index by showing the contribution of each of them to the overall change.

The paper is organized as follows. Section two discusses definitions of well-being and sets out the main criticisms of GDP as a measure of well-being. Section three summarizes the Index of Economic Well-Being (IEWB) and section four presents a methodology for its application to the Lombardy region. Section five reports estimates and compares trends in the Index and its components with trends in GDP per capita. Section six concludes and discusses the main issues for further research.

2. Well-being and its dimensions

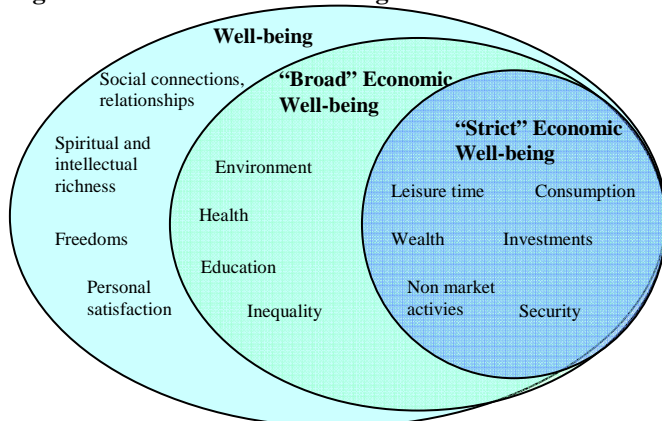
2.1. A definition of well-being

Measuring the well-being of an individual or a nation is a complex undertaking with dimensions that extend beyond the economic measurement of income or wealth and include, for instance, individual freedom, spiritual and intellectual richness, and human relations. Figure 1 provides a possible representation of well-being and its components. A “strict” notion of economic well-being (inner ring) refers to phenomena that can be captured with standard economic indicators. A broader definition of economic well-being (second ring) includes a number of non-material aspects, and it measures “command over resources” (Osberg and Sharpe, 2005). It can be argued that it is the latter sphere that should be the object of specific economic policies (Goossens et al., 2007). There is a third dimension of well-being that comprises “command over agency freedoms”, which to use terms typical of Sen’s approach, concerns the richness of social relations and intellectual life, and personal satisfaction. These characteristics undoubtedly influence the access to economic resources and thus contribute to the definition of the economic variables, but they also have value *per se* in the measurement of well-being. The report by the Commission on the Measurement of Economic Performance and Social Progress (2009) (the so-called Stiglitz Commission) has recently identified eight key dimensions of multi-dimensional well-being: material living standards (income, consumption and wealth), health, education, personal activities including work, political voice and governance, social connections and relationships, environment (present and future conditions), and economic and physical security. In this paper we adopt the approach of Osberg and Sharpe (2005) by focusing on a broad definition of economic well-being that measures “command over resources”. Consideration of all the dimensions of well-being is difficult, and especially because many of them are qualitative and have a subjective origin. Nevertheless, the attempt to measure well-being in a broader sense is on the agenda of many international institutions, and it is a research topic for economists, social scientists and statisticians. A reliable measurement of well-being is important for understanding the effects of democratic processes:

“[...] on the one hand, it makes governments more accountable and trustworthy, and on the other, it encourages people to participate more actively [...] We must provide our societies with new, clear and reliable tools to form their opinions, to make their assessment of the effectiveness of their democracies in fostering social progress.” (OECD, 2008a)

In particular, there is wide agreement that a better measure of economic well-being should take account of economic, social and environmental components “combined into an index with larger ambitions” (Osberg and Sharpe, 2003, p.7). The starting point for an attempt to find a good measure of well-being is the fact that GDP should not be confused with welfare. The next section sets out the main limitations of using GDP as a measure of well-being.

Figure 1 – Elements of well-being



Source: Goossens et al., 2007, with authors' amendments

2.2. Shortcomings of GDP

Per capita GDP is the monetary indicator most commonly used to determine the value of the output of an economy per unit of time. It has also long been considered a good approximation to a nation's welfare. The relation between per capita GDP and economic well-being is perhaps stronger in the first stages of development when the main problem is satisfying basic subsistence needs (Giovannini et al., 2007). In developed economies, dimensions related to social and relational characteristics (trust, voice, self-esteem, non-vulnerability) and measures of social and environmental sustainability (Goossens et al., 2007) become more important in the evaluation of well-being, so that GDP diminishes in its effectiveness as a tool to measure welfare.

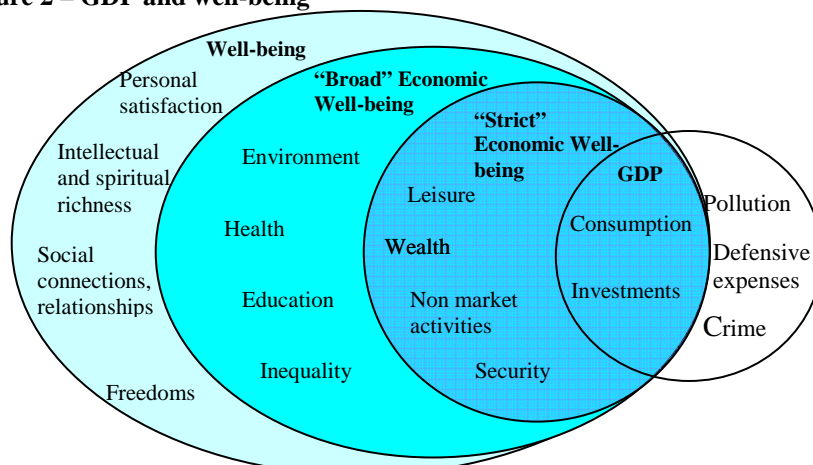
Moreover, GDP values elements that do not contribute to welfare (see figure 2). As R. Kennedy wrote, "gross national product [...] counts air pollution and cigarette advertising, and ambulances to clear our highways of carnage. It counts special locks for our doors and the jails for those who break them. It counts the destruction of our redwoods and the loss of our natural wonder in chaotic sprawl. It counts the cost of a nuclear warhead and armoured cars for police who fight riots in our streets [...]" (Robert F. Kennedy, Address, University of Kansas, Lawrence, Kansas, March 18, 1968). Awareness of the shortcomings of GDP is not new in the scientific and political debate. In 1934 Kuznets stressed that "[...] the welfare of a nation can scarcely be inferred from a measure of national income. Distinctions must be kept in mind between quantity and quality of growth, between costs and returns, and between the short and long run" (S. Kuznets, Report to the US Congress in 1934).

The limits of GDP can be summarised in four main points:

- a) GDP measures only monetary transactions; non-market activities that contribute to economic welfare, like charity activities and domestic work, or the value of leisure, are excluded;
- b) GDP considers all transactions as positive values without distinguishing between activities that make welfare grow and activities that do not correspond to greater well-being (regrettable expenditures, road accidents, etc.);

- c) GDP is an aggregate measure and does not consider the distribution of resources between individuals;
- d) GDP is a measure of flows that neither takes into account the stock of wealth in an economy nor considers environmental and social externalities associated with productive activities.

Figure 2 – GDP and well-being



Source: Goossens et al., 2007, with authors' amendments

The recognition that GDP is neither a sufficient nor a proper indicator for the evaluation of the “progress” of a complex society is increasingly widespread among leading international institutions. Several indexes have been developed that provide broader measures of economic well-being. In the 1990s the United Nations Development Programme (UNDP) introduced the Human Development Index (HDI), which combines three dimensions: life expectancy, educational attainment, and GDP per capita. In 2001 the European Commission (EU) proposed a vector of indicators linked to health, education, unemployment, poverty and inequality as measures of social performance (Atkinson et al., 2002; Atkinson, 2002). The EU has also recently proposed an extended set of indicators which include, in line with the Lisbon criteria, sustainability, research and innovation capabilities, and social cohesion. The OECD has recently stressed the importance of social aspects as determinants of welfare, and it has organised several conferences on this topic (Milan 2006, Istanbul 2007; see Boarini et al., 2006).

A further recent initiative in this direction has been taken by the French government with its establishment of a commission to propose an appropriate measure of a society’s economic and social performance (the so-called Stiglitz Commission, from the name of its President).

The next section describes one of the most recent and complete well-being indicators: the Index of Economic Well-Being, developed by the Centre for the Study of Living Standards (CSLS). In section 4 we apply this index to Lombardy.

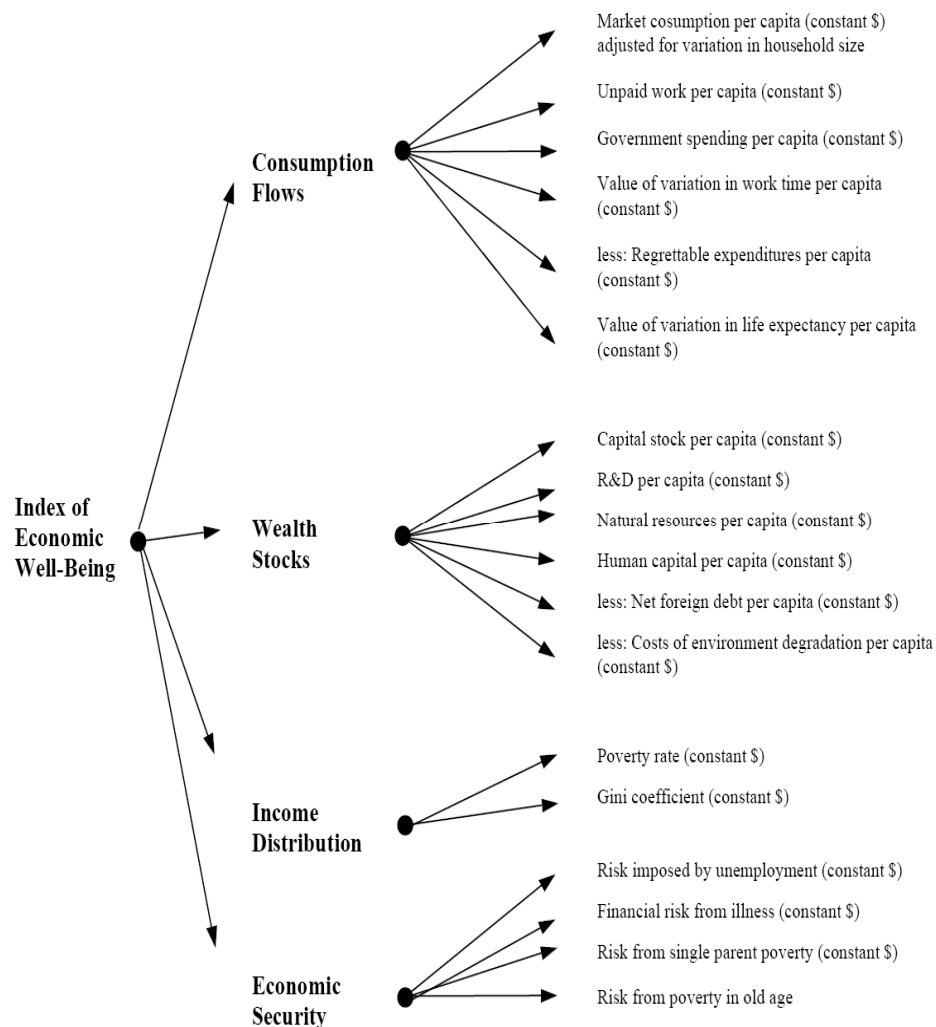
3. Methodological background: the Index of Economic Well-Being (IEWB)

The Index of Economic Well-Being was developed by the Centre for the Study of Living Standards (CSLS) (Osberg, 1985; Osberg and Sharpe, 2002, 2005; Smith, 2003) and it is one of the best known indexes used in the estimation of economic well-being

(Sharpe, 1999). The IEWB follows the “composite indicators approach”, which combines several elementary sub-indexes to cover a broad spectrum of domains affecting well-being (Stiglitz Commission, 2008). The weighting procedure used to aggregate elementary indexes is arbitrary, so that this approach “does not provide a unified way of measuring heterogeneous dimensions of well-being” (Stiglitz Commission, 2008, p.13). As suggested by Osberg and Sharpe, a society’s well-being is not a single, objective number; rather, individuals in a society make subjective evaluations of objective data (Osberg and Sharpe, 2005). It is for this reason that the weights attached to each component vary according to subjective evaluations.

The IEWB measures well-being in terms of command over resources, and it covers four dimensions: current effective per capita consumption flows, net societal accumulation of stocks of productive resources, income distribution and economic security. In particular, sub-indexes are constructed as follows (see Figure 3):

Figure 3: The CSLS Index of Economic Well-Being (IEWB)



1. consumption flows include market consumption adjusted for variations in household size (economies of scale in household consumption), unpaid work (charity and housework), government spending, variations in working time and in life expectancy. Finally, regrettable or defensive expenses are subtracted;

2. wealth stocks identify the accumulation of productive resources and include the net physical capital stock, the stock of research and development expenditures, the stock of natural resources and the stock of human capital. To better capture the well-being of future generations, the level of foreign debt and the costs of environmental degradation (due to CO₂ emissions) are subtracted from the stocks of wealth.

The sub-components of the consumption flows and wealth stocks are expressed in constant dollars on a per capita basis;

3. the inequality dimension encompasses inequality of income distribution, defined by the Gini coefficient, and intensity of poverty, measured using the Sen-Shorrocks-Thon index. This component is a weighted average of the two indexes;

4. the economic insecurity dimension aggregates four sources of risk: unemployment, illness, widowhood (or single female parenthood) and old age. The costs of risk are estimated as the probability of being in that condition times the financial compensation provided by the welfare system.

Sub-indexes are normalized through linear scaling over the historical range of values observed for all the countries that are taken into account, thus allowing comparison of both the trend over time and cross-country levels of economic well-being. Indexes are then aggregated using weights that vary according to subjective evaluations of the relative importance of each dimension of well-being.

The four components of IEWB recognize “both trends in average outcomes and in the diversity of outcomes, both now and in the future”, as shown in Table 1 (Osberg and Sharpe, 2005, p. 314).

Table 1. Dimensions of economic well-being or command over resources

<i>Concept</i>	<i>Time period</i>	
	<i>Present</i>	<i>Future</i>
<i>“Typical citizen” or “representative agent”</i>	Average flow of current income	Aggregate accumulation of productive stocks
<i>Heterogeneous citizens</i>	Distribution – income inequality and poverty	Insecurity on future income

Source: Osberg and Sharpe (2005)

4. IEWB: an application to Lombardy

4.1. Dimensions of economic well-being

This study takes the IEWB as its starting point and develops an index of economic well-being for Lombardy. A first difference between the Osberg and Lombardy estimations of the IEWB is that the former examines the trend of economic well-being both over time and across countries, the latter analyses the changes in Lombardy well-being over time. A second difference is that we add health measures as a further dimension of the Index (the final report of the Stiglitz Commission (2009) identifies health as one of the key elements of well-being). On the other hand, being constrained by data gaps at the regional level, we cannot evaluate environmental conditions and we measure economic insecurity only in the employment dimension through job instability associated with temporary contracts.

Our Index of Economic Well-Being combines five dimensions; each dimension may be the weighted sum of different sub-components (see Figure 4):

1. consumption flows. These include four sub-components: i) consumption of market goods and services adjusted for variations in household size (economies of scale) and life expectancy, ii) government spending, iii) unpaid work (charity and housework), and iv) defensive expenditures (commuting costs and costs of road accidents), which are subtracted from the above components;

2. wealth stocks. These include three sub-components: i) fixed capital stock adjusted for depletion of natural resources (farmland and non-renewable resources), ii) a measure of the accumulated stock of research and development and iii) the stock of human capital. Because of the lack of data at a regional level, we do not consider the value of stocks of natural resources and the costs of environmental degradation due to CO₂ emissions, which are included in the IEWB proposed by Osberg and Sharpe;

3. employment security index. This is measured by the index number of the share of “non-temporary employees” over active population.² Increasing work flexibility makes the distinction between temporary and non-temporary employment important in measuring employment security. A welfare evaluation of temporary employment is controversial: on the one hand, temporary employment makes the labour market more dynamic and can help lower unemployment rates, on the other hand, temporary workers’ jobs are precarious, and they do not enjoy all the benefits associated with long-term contracts. “Fear of job loss can have negative consequences for the quality of life of each worker, for firms, and for society as a whole” (Stiglitz Commission, 2009, p. 48). Precarious (atypical) workers are often young or older people, and women, i.e. more vulnerable citizens.

Because of the lack of data at a regional level, the security component of the index measures only the employment issue, and does not include the other sources of security considered in the original IEWB and described in section 3;

4. income distribution. Following Osberg and Sharpe, we include inequality of income distribution and poverty as elements of the Index. We measure two sub-components of this dimension: i) inequality through the Gini coefficient and ii) the intensity of poverty with the Sen-Shorrocks-Thon index;

5. health. We construct the health index by defining first a mortality index with two sub-components: i) infant mortality, which is an internationally recognised index of a population’s health condition, and ii) avoidable mortality, defined as deaths that should not occur in the presence of effective and timely health care. In particular, we consider the following causes of death: HIV, suicide, cancer due to smoking and drinking habits. We then transform the mortality index in a health index by an algebraic transformation.

The overall Lombardy IEWB is constructed as a weighted average of the five dimensions. With α_i denoting the subjective weight associated with each dimension, we have at time t:

$$(1) \quad I_t = \sum_{k=1}^5 \alpha_k I_t^k \quad (\sum \alpha_k = 1)$$

Each dimension I_t^k can have more than one sub-component, each with a specific objective weight in terms of monetary value (for instance, consumption vs. public expenditure for the first dimension) or in terms of reference population (as regards the

² A similar measure has been used by Murias et al., 2006.

two mortality variables in the health dimension). If we use the subscript h to indicate the specific sub-components and \bar{h}_k the number of these sub-components for the k -th dimension, we can write (equation 2):

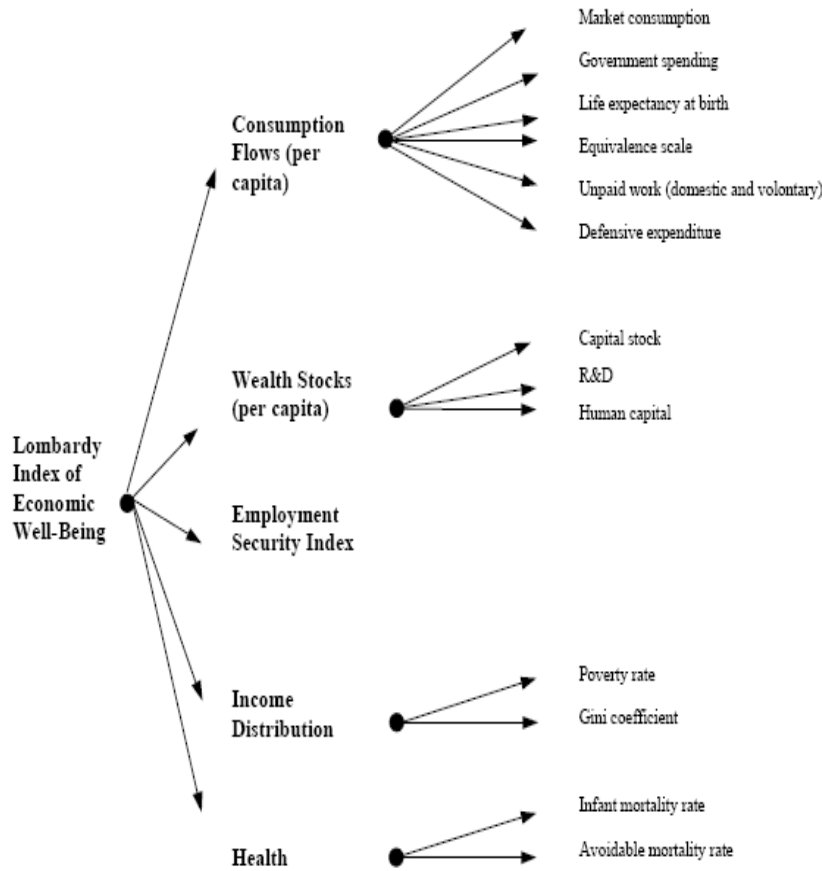
$$(2) \quad I_t^k = \frac{\sum_h V_t^{h,k}}{\sum_h V_0^{h,k}} = \frac{\sum_h \frac{V_t^{h,k}}{V_0^{h,k}} V_0^{h,k}}{\sum_h V_0^{h,k}} = \sum_h I_t^{h,k} q_0^{h,k} \quad (\forall h \subset h_k)$$

$$\text{with: } q_0^{h,k} = \frac{V_0^{h,k}}{\sum_h V_0^{h,k}} \quad \left(\sum_h q_0^{h,k} = 1 \right)$$

The specific definitions of the weights are reported in Table 3. The overall index of well-being can consequently be written as a weighted sum of the whole vector of sub-components, as in equation (3). This will be useful for the detailed analysis of the contribution of each sub-component to changes in the index (see sub-section 3.2):

$$(3) \quad I_t = \sum_k \sum_h I_t^{h,k} (\alpha_k q_0^{h,k}) = \sum_k \sum_h I_t^{h,k} \pi_0^{h,k} \quad \left(\sum_k \sum_h \pi_0^{h,k} = 1 \right)$$

Figure 4 – The Index of Economic Well-Being applied to Lombardy



4.2. Data and variables

This section details how we estimated the five key dimensions of the index and their data sources (see appendix A for a more specific description of the methodology and appendix C for the list of data sources).

1. Index of per capita adjusted consumption. The per capita Adjusted Consumption Index was obtained by adding to final consumption of goods and services the value of housework and charity work services, the current public expenditure and by removing defensive expenses. The resulting value was subsequently divided by Lombardy's population, deflated with GDP deflator and indexed to 1995 as the base year.

Adjusted final consumption. This component was based on final consumption at current prices for the period 1995-2005. The value was first corrected using the Carbonaro equivalence scale and then multiplied by an index measuring the increase in life expectancy to capture the effect on well-being relative to improvements in living conditions.

Housework and charity work. The values of both housework and charity work were computed as the product of hourly wages times the number of average yearly hours devoted to each activity times the population aged over 15. These values were firstly computed for men and women separately and then added up.

Yearly hours devoted on average to housework and charity work were computed using the ISTAT Multiscope Survey (subset data for Lombardy). The housework hourly wage was estimated by using ISTAT gross salaries of domestic services at current prices. The hourly net salary was obtained by applying a coefficient representing the weight of taxation on wages (OECD parameters). The hourly wage for charity work was computed in the same way, but starting from the gross salary of *Other public, social and personal services*.

Current public expenditure. Public expenditures for staff, goods and services were computed through Regional Public Accounts.

Defensive expenditure. This item represented all costs related to commuting activities and road accidents. The cost of commuting was computed by applying to transport expenditures in Lombardy the share that can be attributed to commuting, the estimation of which was obtained through a 2002 regional survey on commuting workers.

The costs of road accidents were computed by multiplying the number of road accidents in Lombardy by the average social and administrative cost of a road accident (national data).

2. Index of Wealth Stocks. The measure of the stock of wealth was computed as the sum of the adjusted fixed capital stock, the R&D stock and the human capital stock; this sum was then divided by the Lombardy population and indexed to 1995 as the base year.

Adjusted fixed capital stock. The stock value of fixed capital was provided by ISTAT. The share attributed to Lombardy was derived from research carried out by CRENoS in 1994 (18.2% of the national amount). The value of the loss in agricultural land and non-renewable sources was subtracted from the previous estimation.

R&D stock. This took account of both public and private research spending³ and was computed by cumulating over time annual flows with a depreciation rate of 20%.

³ Universities' expenditures on research were not included.

Human capital stock. The human capital stock was estimated as the sum of all education expenditure made by the population of working age given the educational level attained, that is, the actual number of years spent within the school system. The data on annual average expenditure per year of schooling in Italy was taken from OECD Annual Reports. In order to capture only the real accumulation of human capital, purging changes in costs, we used the monetary cost of a schooling year in 1995 for all years.

3. *Employment security Index.* Employment security was measured by the ratio between “non-temporary employees” and the population aged over 16 (INPS data) and indexed to 1995 as the base year.

4. *Income distribution Index (income inequality and poverty)*

Consistently with the IEWB approach, we evaluated income inequality by means of the Gini coefficient and intensity of poverty by means of the Sen-Shorrocks-Thon index (SST). Our estimates were based on the Survey of Household Income and Wealth (SHIW) conducted by Bank of Italy.⁴ We used a broad definition of after-tax monthly real equivalent incomes⁵. We followed the methodology adopted by Boeri and Brandolini (2005) which considers households as the economic units of aggregation, while individuals are the welfare units. This means that each household’s income is counted as many times as the number of household’s members. Income inequality among individuals was measured by attributing to every person his or her household’s equivalent income on the basis of the OECD equivalence scale. We corrected for the presence of outliers by setting any value greater than the 99th percentile equal to the value of this same percentile (see Cannari and D’Alessio, 2003).

Since a decrease in poverty and inequality corresponds to an increase in the index of well-being, we converted the Gini and SST coefficients into “positive” indexes (i.e. (1-Gini) and (1-SST), see Appendix A). These measures were then aggregated using arbitrary weights reflecting the relative importance of one dimension with respect to the other. Following Osberg and Sharpe (2000), poverty was given three times the weight of inequality.

5. *Health Index.* Infant mortality index and avoidable mortality index (with 1995 as the base year) were aggregated to create a mortality index, with weights representing the reference population for the two phenomena (live births for infant mortality and total population for avoidable mortality). Subsequently, in order to associate a decrease in the mortality index to an increase in well-being, we computed the health index as [2-(mortality index)].

⁴ The Historical Archive covers the years 1991, 1993, 1995, 1998, 2000, 2002, 2004 and 2006 and reports information at the household level. Missing years are estimated as linear interpolations between the two adjacent years covered by the survey.

⁵ We used a broad definition of household income as comprising wages and salaries, income from self-employment, pensions, public assistance, private transfers, income from real properties, imputed rental income from owner-occupied dwellings, and yields on financial assets net of interest paid on mortgages. We obtained real income by dividing self-reported income by the Household final consumption Expenditure Deflator (HED) available in national accounts.

5. Estimates of economic well-being for Lombardy over time, 1995-2005

In this section we discuss the main results by examining the evolution of both the Index and its dimensions over time and the GDP per capita index (sub-section 5.1). We then conduct more detailed analysis of all the sub-components of the Index (sub-section 5.2).

5.1 The evolution of the index and its dimensions

Figure 5 and Table 2 describe the evolution of the five dimensions of the index. It can easily be seen that each component follows a different trend.

Consumption, which is the most classic dimension of economic well-being, shows an overall increasing evolution that can be roughly divided into two different phases. During the first phase until 2001, per capita consumption exhibits strong expansion, while during the following phase (2002- 2005), it declines, with a slight upturn from 2004.

On the other hand, per capita wealth stocks (fixed, human and R&D) show an upward trend throughout the whole period due in particular to a growth in the stock of physical and human capital that overhangs a reduction in R&D stocks (for decreasing investments in R&D of private firms).

The health index contributes positively to Lombardy's overall economic well-being during the period considered. The increasing health index can be credited to better management of the regional health care system, which had a positive effect on both control and prevention activities.

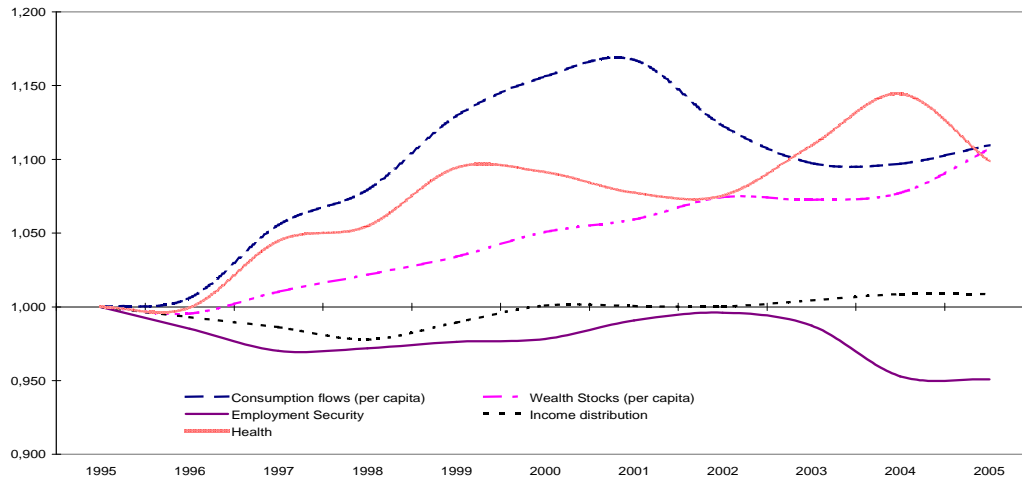
The slight improvement in income distribution from 1998 onwards indicates a more equal allocation of Lombardy household incomes, which is a highly positive characteristic for a complex society like Lombardy's.

The contribution of the employment security component is negative. This is due to the rising number of workers employed on fixed-term contracts. Valuation considerations about different types of contracts would fall outside the scope of this analysis, but it seems reasonable to associate temporary jobs with greater economic vulnerability.

Table 2 – Dimensions of the Index of Economic Well-Being for Lombardy

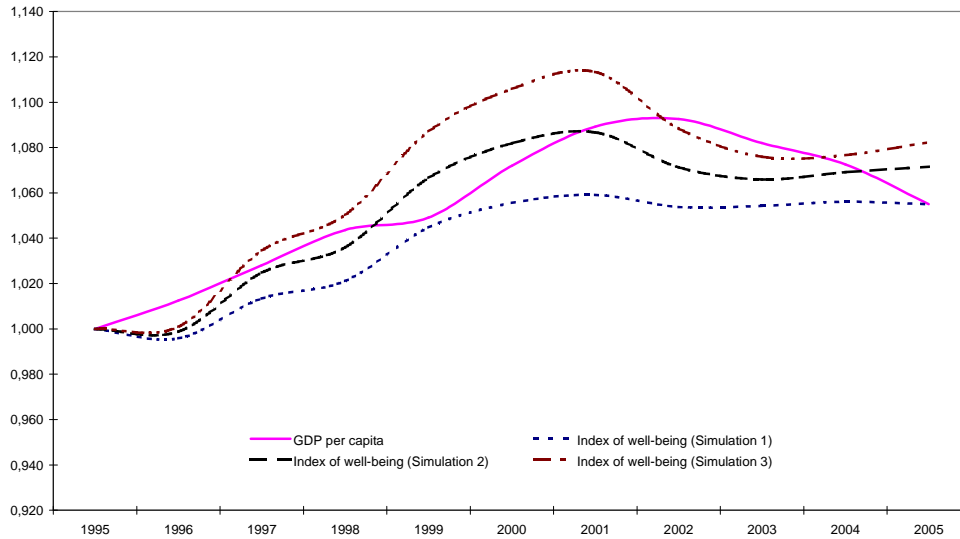
Year	Consumption Index	Wealth Stocks Index	Employment Security Index	Income Distribution Index"	Health Index
1995	1.000	1.000	1.000	1.000	1.000
1996	1.006	0.996	0.984	0.993	0.999
1997	1.056	1.010	0.967	0.986	1.045
1998	1.079	1.022	0.968	0.978	1.055
1999	1.129	1.034	0.971	0.989	1.094
2000	1.156	1.051	0.973	1.001	1.091
2001	1.168	1.059	0.983	1.001	1.077
2002	1.123	1.074	0.983	1.000	1.075
2003	1.098	1.073	0.957	1.004	1.109
2004	1.097	1.077	0.936	1.009	1.144
2005	1.110	1.107	0.939	1.009	1.099

Figure 5 – Dimensions of the Index of Economic Well-Being for Lombardy



Source: Authors' calculations

Figure 6 – Index of Economic Well-Being in all three simulations and per capita GDP



Source: Authors' calculations

In order to obtain the general Index on Economic Well-Being, all components were aggregated by using subjective weights. According to Osberg and Sharpe's approach (2000, 2005), we first set all weights at an equal value (simulation 1 in figure 6). This implies that every variation of opposite sign and equal magnitude in any component of the index would automatically cancel out. Do changes in consumption have as much weight as changes in health or income distribution? Which component should be regarded as the most relevant? We did not have any prescriptive rule that could help us answer this question: weights are subjective and their identification process may vary according to people's opinions and policy makers' particular purposes. As suggested by the Stiglitz Commission (2008), it would be interesting to identify weights on the basis of a public survey in which people were asked to order different aspects of well-being by a personal judgement on their importance. Since such information is currently still unavailable, we decided to adopt the approach suggested by the literature (Osberg and

Sharpe, 2000) and set two more combinations of subjective weights. In simulation 2 we associate the following weights to each component: 0.4 to consumption, 0.15 to wealth stocks and health, 0.1 to employment security and 0.2 to income distribution. Simulation 3 gave much more importance to the consumption component ($\alpha_I = 0.6$) while weighting the remaining dimensions equally (see Table 3).

Since the evolution of the general index depends mainly on consumption, a higher weight given to this component (from 0.2 to 0.6) causes a shift upward of the whole curve.

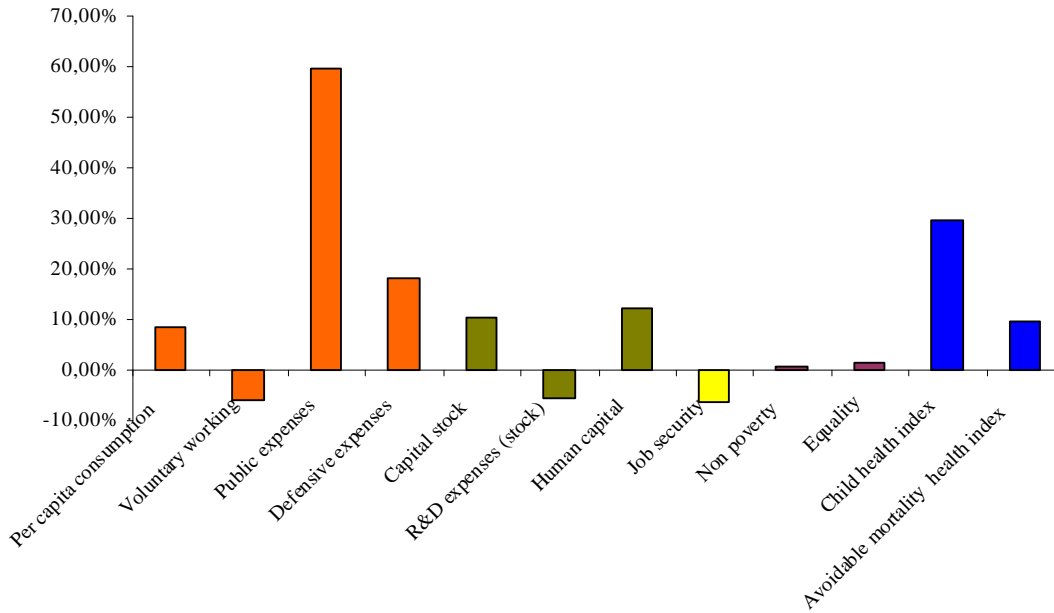
Figure 6 compares the trend of the index in the three simulations with the trend of per capita GDP (index number). The two series are aligned in the first period (1995-2001), in which both indexes increase steadily, but they diverge in the following phase. Well-being exhibits a strong decline in 2002 due to a consumption crisis (the negative change in the IEWB is more evident in simulations that give a greater weight to consumption), while the positive trend in GDP continues also in 2002. It is interesting to note that, during the last two years analysed (2004-05), economic well-being slightly increased while regional per capital GDP decreased.

Analysis of the sub-components of each dimension of IEWB aids understanding which elements are responsible for the trends shown in Figures 6. The following sub-section deals with this issue.

5.2. Components analysis

Table 4 plots the evolution of the specific sub-components indexes, $I_t^{h,k}$, and Figure 7 shows the total change of each specific sub-component for the period 1995-2005. The greatest changes occurred for public expenditure (and partially for consumption) in the first dimension, for child health in the last one, and – albeit with lower intensity – for the components of human and physical capital stocks. There are two significant negative changes: they concern labour security and accumulated investment in R&D. The great majority of the sub-components underwent more impressive growth in the first part of the period (until 2000) and a less significant evolution thereafter (see Table 4). In particular, it is worth noting the decrease in the index of consumption expenditure in the period 2001-2004.

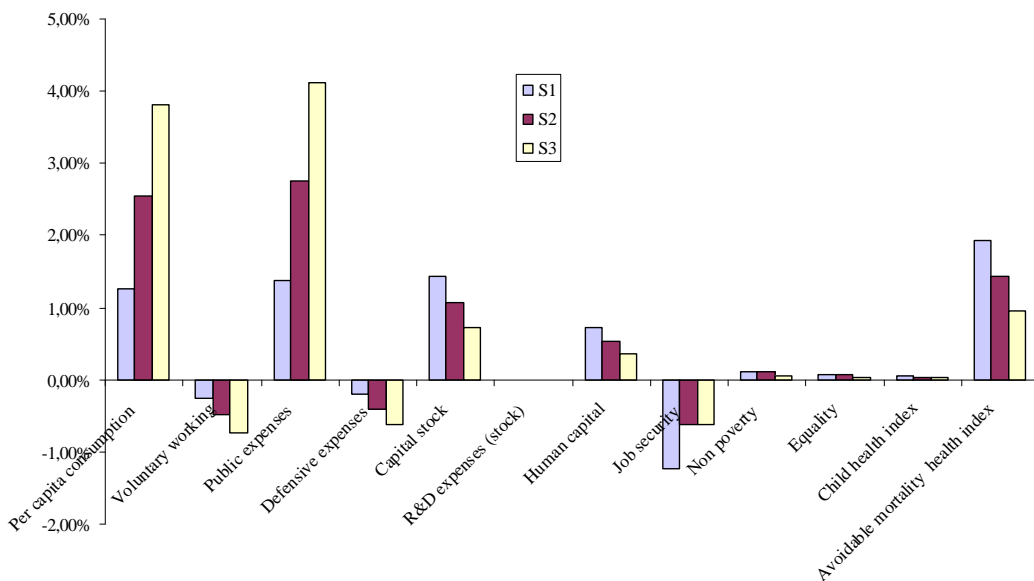
Figure 7 – Changes in the index level of the specific sub-components, 1995-2005



Source: Authors' calculations

If we weight the evolution of the different sub-components with the weights $\pi_0^{h,k}$ of equation (3) reported in Table 3, we can measure their specific contribution to the index in the three simulations (figure 8). In simulation 1 the evolution of the index is due essentially to four components: private consumption, public expenditure, health index for avoidable mortality, and physical capital stock index. In simulations 2 and 3 the weights of consumption and public expenditure become predominant. Apart from these, the only significant items are the health index for avoidable mortality and physical capital stock, with a positive contribution, and job security with a negative one.

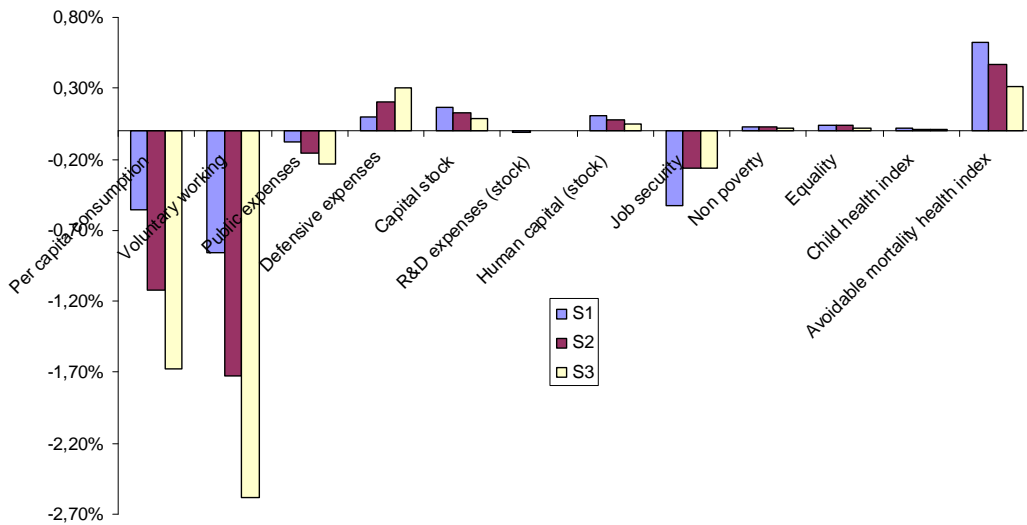
Figure 8 – Contributions of the specific sub-components to the overall index, in the three simulations, 1995-2005



Source: Authors' calculations

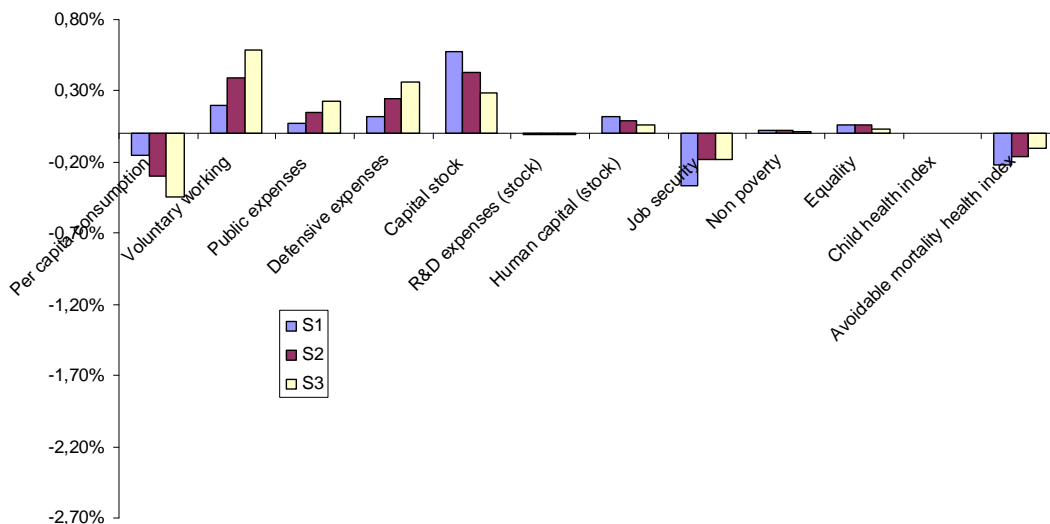
As shown in Figure 6, during the period 2002-03 the Index of economic well-being decreased, while in 2004-05 it exhibited a slight increase. In order to gain better understanding of which elements determined this result, we analysed the weighted contributions of each sub-components to the overall Index for these two phases (Figure 9 and 10). The negative trend was mainly due to a decrease in consumption, voluntary work, and job security. Voluntary work, public expenses and capital stock grew in 2004-05, thus leading to an increase in the overall index (per capital consumption grew only in 2005).

Figure 9 – Contributions of the specific sub-components to the overall index, in the three simulations, 2001-2003



Source: Authors' calculations

Figure 10 – Contributions of the specific sub-components to the overall index, in the three simulations, 2003-2005



Source: Authors' calculations

Table 3 – The weights used in the three simulations.

Dimensions	Sub-components	Simulation 1			Simulation 2			Simulation 3		
		α weights	q weights	π weights	α weights	q weights	π weights	α weights	q weights	π weights
Consumption (corrected)	Per capita consumption	0.2	0.7329	0.1466	0.4	0.7329	0.2932	0.6	0.7329	0.4397
	Voluntary working		0.2083	0.0417		0.2083	0.0833		0.2083	0.1250
	Public expenses		0.1153	0.0231		0.1153	0.0461		0.1153	0.0692
	Defensive expenses		-0.0564	-0.0113		-0.0564	-0.0226		-0.0564	-0.0339
Wealth stocks	Capital stock	0.2	0.6962	0.1392	0.15	0.6962	0.1044	0.1	0.6962	0.0696
	R&D expenses (stock)		0.0076	0.0015		0.0076	0.0011		0.0076	0.0008
	Human capital		0.2962	0.0592		0.2962	0.0444		0.2962	0.0296
Job security	Job security	0.2	1.0000	0.2000	0.1	1.0000	0.1000	0.1	1.0000	0.1000
Equality	Non poverty	0.2	0.7500	0.1500	0.2	0.7500	0.1500	0.1	0.7500	0.0750
	Equality		0.2500	0.0500		0.2500	0.0500		0.2500	0.0250
Health	Child health index	0.2	0.0086	0.0017	0.15	0.0086	0.0013	0.1	0.0086	0.0009
	Avoidable mortality health index		0.9914	0.1983		0.9914	0.1487		0.9914	0.0991

Table 4 – Indexes of the specific sub-components, $I_t^{h,k}$, 1995-2005

anno	Per capita consumption	Voluntary working	Public expenses	Defensive expenses	Capital stock	R&D expenses (stock)	Human capital	Job security	Non poverty	Equality	Child health index	adult health index
1995	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
1996	1.0160	0.9586	1.0276	1.0029	0.9887	0.9997	1.0115	0.9837	0.9958	0.9846	1.0509	0.9990
1997	1.0632	0.9992	1.1018	1.0407	1.0022	0.9938	1.0297	0.9674	0.9937	0.9630	1.1350	1.0439
1998	1.0864	0.9949	1.2251	1.1567	1.0103	0.9899	1.0497	0.9681	0.9885	0.9459	1.2239	1.0532
1999	1.1180	1.0323	1.4365	1.2497	1.0224	0.9927	1.0624	0.9715	0.9958	0.9701	1.2149	1.0933
2000	1.1424	1.0714	1.4820	1.3287	1.0427	1.0033	1.0709	0.9729	1.0031	0.9943	1.2649	1.0898
2001	1.1349	1.1008	1.5981	1.3768	1.0493	1.0169	1.0836	0.9833	1.0031	0.9929	1.1625	1.0767
2002	1.1100	0.9993	1.5367	1.3450	1.0645	1.0141	1.0993	0.9826	1.0031	0.9915	1.3112	1.0732
2003	1.0967	0.8939	1.5638	1.2876	1.0614	0.9834	1.1012	0.9571	1.0052	1.0014	1.2792	1.1079
2004	1.0808	0.9041	1.6012	1.2027	1.0671	0.9564	1.1044	0.9357	1.0073	1.0128	1.4016	1.1421
2005	1.0866	0.9407	1.5961	1.1808	1.1025	0.9427	1.1218	0.9385	1.0067	1.0142	1.2964	1.0970

6. Conclusion

The awareness that GDP is neither a sufficient nor a proper indicator for the evaluation of the well-being of a society has led to the development of several indexes with larger ambitions and which combine economic and social trends, as well as addressing environmental and sustainability issues. One of the best known and most important indexes is the Index of Economic Well-Being (IEWB) developed by Osberg and Sharpe. IEWB encompasses the economic domain defined in a broad sense to include elements such as poverty, inequality, and economic insecurity. Because it is a synthesis of different dimensions, the Index can easily be broken down to specify the contribution of each dimension to the overall evolution over time. This enables policy-makers to identify problems and policies. An interesting feature of this approach is that the weights attached to each dimension of economic well-being can vary according to subjective evaluations. "It is argued that public debate would be improved if there is explicit consideration of the aspects of economic well-being obscured by average income trends and if the weights attached to these aspects were explicitly open for discussion" (Hagerty et al., 2001)

This study has analyzed the economic well-being of Lombardy over time (years 1995-2005) by developing a composite indicator on the basis of the Index of Economic Well-Being (IEWB). In the analysis reported we slightly modified the Index with respect to the original version (Osberg and Sharpe, 2005). In particular, health was added as a specific new dimension, while economic security was measured only by employment security. Data unavailability at the regional level was significant in some fields, in particular for the measurement of environmental conditions.

We simulated the evolution of the indicator for the period 1995-2005 in three different scenarios, changing the weights given to the different dimensions. The basic scenario (simulation 1) weighted all the dimensions equally, the other scenarios attributed more weight to the consumption component. The evolution of the index was substantially in line with the evolution of per capita GDP from 1995 to 2001 but diverged in the following period. Well-being exhibits a strong decline in 2002, mainly due to a consumption crisis and a decline in voluntary work, and a slight increase in 2004-05 (owing to a positive trend in voluntary work, public expenses and capital stock). Per capita GDP showed a negative trend between 2003 and 2005.

Analysis of the specific sub-components of the index showed that the most important contributions to the overall change in the index were made by the health dimension, human and physical capital accumulation and, among economic aspects, the significant growth in public expenditure and (for the first part of the period) of consumption. It is worth noting that the dimension of job security played a negative role in the changes of the level of well-being.

A number of questions remain unresolved. Firstly, a very important issue in the construction of the Index is the choice of weights (Sharpe, 1999). As we have shown, the value of the index may be very sensitive to these weights, and there is no clear agreement in the literature on the criteria to use in weighting.

Secondly, another important issue which should be considered is that of financial sustainability, for instance by using regional balance of payment indicators or the regional system's level of indebtedness. In fact, financing consumption through

indebtedness makes the system (and the level of welfare) more vulnerable, as has been evidenced by the current financial crisis.

A third consideration regards environmental sustainability. The report by the Stiglitz Commission (2009) identifies environmental conditions (present and future) as a key dimension of well-being: “they are important not only for sustainability, but also because of their immediate impact on the quality of people’s lives” (p.52). According to Stiglitz, Sen and Fitoussi, existing indicators of environmental conditions are limited or badly measured, and “more work is needed to relate changes in environmental indicators to changes in well-being” (p.52).

A fourth consideration concerns the role of capabilities as determinants of well-being. The report by the Stiglitz Commission (2009) underlines that “what really matters are the capabilities of people, that is, the extent of their opportunity set and of their freedom to choose among this set, the life they value” (p. 15). Capabilities “represent the various combinations of functionings (beings and doings) that the person can achieve. Capability is, thus, a set of vectors of functionings, reflecting the person’s freedom to lead one type of life or another ... to choose from possible livings” (Sen, 1992, p. 40). Functionings include working, resting, being literate, being healthy, being part of a community, being respected, and so forth. The challenge is to construct an index with broader ambitions and which seeks to capture not only the “command over resources” (as in IEWB) but also “command over agency freedom”, i.e. capabilities.

A final issue concerns social capital, and in particular the structural dimension of social capital identified by social networks. The Stiglitz Commission (2009) points out that social connections improve the quality of life. When addressing the effects of social capital on economic well-being we have to take two main considerations into account. The first is that social capital is a multidimensional concept and each dimension may exert diverse effects on development and well-being (Sabatini, 2009). It is still unclear what type of social networks exert a positive effect on the different dimensions of development (Sabatini, 2008). In fact, social capital is a value-free concept: “it is conservative or even harmful in some cases, even if it is productive and benign in other cases” (Paldam, 2000, p. 635). The second consideration is that, while some of the effects of social capital on economic variables may be already captured by the elements included in the IEWB, social networks give more to well-being than those effects. It would thus be interesting to investigate the relationship between social networks and non-material dimensions of well-being like capabilities on a broader definition of economic and social well-being.

Appendix A. Methodology

The index has been constructed according to the following formula (see eq. (1) in the text):

$$(1) \quad I_t = \sum_{k=1}^5 \alpha_k I_t^k \quad (\sum \alpha_k = 1)$$

With (as in eq. (2)):

$$I_t^1 = \frac{{}_{pc}C_t \cdot HE_t \cdot LE_t + {}_{pc}G_t + {}_{pc}UP_t - {}_{pc}D_t}{{}_{pc}C_0 \cdot HE_0 \cdot LE_0 + {}_{pc}G_0 + {}_{pc}UP_0 - {}_{pc}D_0} = \frac{\sum_1^4 V_t^{1,k}}{\sum_1^4 V_0^{1,k}} = \sum_1^4 I_t^{1,k} q_0^{1,k}$$

$$I_t^2 = \frac{{}_{pc}K_t + {}_{pc}R \& D_t + {}_{pc}HC_t}{{}_{pc}K_0 + {}_{pc}R \& D_0 + {}_{pc}HC_0} = \frac{\sum_1^3 V_t^{2,k}}{\sum_1^3 V_0^{2,k}} = \sum_h^3 I_t^{2,k} q_0^{2,k}$$

$$I_t^3 = \frac{ER_t}{ER_0} = \frac{V_t^{3,1}}{V_0^{3,1}} = I_t^{3,1}$$

$$I_t^4 = \beta \frac{1-SST_t}{1-SST_0} + (1-\beta) \frac{1-Gini_t}{1-Gini_0} = \frac{\sum_1^2 V_t^{4,k}}{\sum_1^2 V_0^{4,k}} = \sum_h^3 I_t^{4,k} q_0^{4,k}$$

($q_0^{4,1} = \beta$ is the subjective weight associated with poverty intensity vs. inequality)

$$I_t^5 = a(2 - \frac{IM_t}{IM_0}) + (1-a)(2 - \frac{AM_t}{AM_0}) = \sum_h^3 I_t^{5,k} q_0^{5,k}$$

Where:

α_i are the weights associated with each component of the indicator $\sum_{i=1}^5 \alpha_i = 1$

Consumption Index:

${}_{pc}C$ = per capita consumption expenditure on final goods and services

HS = Carbonaro index to allow for equivalence scales

LE = life expectancy index

${}_{pc}G$ = current public expenditures

${}_{pc}UP$ = value of non-paid work (domestic and charity)

${}_{pc}D$ = defensive expenses (costs due to commuting activities and road accidents)

Wealth Stocks Index :

${}_{pc}K$ = adjusted capital stock at constant prices (adjusted to the loss in agricultural land and in non-renewable sources)

${}_{pc}R\&D$ = R&D stock at constant prices

${}_{pc}HC$ = human capital stock valued at 1995 prices

Economic security Index (employment security):

ER = employment rate of non-temporary workers

Income distribution index:

SST = intensity of poverty (Sen–Shorrocks–Thon Index)

Gini = Gini coefficient of income inequality

β = subjective relative weight associated with intensity of poverty

Health index:

IM = Infant Mortality rate

AM = Avoidable Mortality rate (causes of death: AIDS, suicide, cancer due to smoking and drinking habits)

a = objective weight associated with the relative dimension of the specific population of each variable included in the health index:

$a = p1/(p1+p2)$ and $p1 = \text{live births}$, $p2 = \text{total population}$

The basic year for index numbers is 1995. All monetary values are at constant 1995 prices. Current values are deflated with GDP deflator.

Appendix B. Construction of coherent time series of the GDP and other economic variables

In 2000, ISTAT changed the most important time series for this analysis (GDP, household expenditure, etc.), and a new estimation computed according to ESA95 (European System of Accounts) was made. In order to make the old and new data comparable, the following methodology was used. Let us call VS_t^s the values of the old generic time series s for year t (available from 1995 to 2004) and NS_t^s the value of the new generic time series s during the year t (available from 2000 to 2005). Our purpose was to recalculate the values during the period 1995-1999 in a manner comparable with the new data. The methodology proceeded as follows:

- compute the ratio between the values of the variable in year 2000 for the new and the old time series:

$$r_{2000}^{S,N/V} = \frac{NS_{2000}^s}{VS_{2000}^s};$$

- for the years 1995-1999, use this ratio to correct the values of the old series, as described below:

$$NS_t^s = VS_t^s \times r_{2000}^{S,N/V} \quad (t = 1995 - 1999).$$

Appendix C. Data sources⁶

Variables	Sources
Resident population (total, males and females)	Istat – Health for all - Italy
Population aged over 15	Istat – Health for all - Italy
Final expenses for consumption goods – current prices	Istat
Gross Domestic Product – current prices	Istat
Gross Domestic Product – constant prices	Istat
Gross Domestic Product – chained series	Istat
Gross salaries at current prices – Other public social and personal services	Istat – Regional Accounts
Gross salaries at current prices – Domestic services for households	Istat – Regional Accounts
Total employed	Istat – Regional Accounts
Labour force	Istat
Total employed – Other public social and personal services	Istat – Regional Accounts
Total employed – Domestic services for households	Istat – Regional Accounts
Current public expenditures – on staff – on goods and services	Regional Public Accounts – Finance Minister
Transport expenditures – current prices	Istat
Road accidents – Italy – Lombardy	Ring Lombardia
Social costs due to a road accident - Italy	Istat – Transport statistics
Total net capital by proprietary branch at substitute prices - Italy	Istat
Labour force and non-labour force aged over 16 by level of education	Istat – Workforce Survey and CNEL elaborations on Istat data.
Fixed-term employed. Total registered on 31 December - Lombardy	Inps
Live births	Istat – Health for all – Italy
Infant mortality rate	Istat – Health for all – Italy
Suicide and self-injury rate	Istat – Health for all – Italy
AIDS mortality rate	Istat – Health for all – Italy
Mortality rate due to digestive system cancer	Istat – Health for all – Italy
Mortality rate due to malignant trachea, bronchial tube and lung cancer	Istat – Health for all - Italy
Life expectancy at 0 years (males and females)	Istat – Health for all - Italy
Average number of household members	Istat – Health for all - Italy
Household net disposable income	Bank of Italy's survey on Italian household budget

⁶ The authors thank IRER that has kindly provided the great part of the data

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