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**SEMINAR ON MEASURING CAPITAL – BEYOND THE TRADITIONAL MEASURES
SESSION III**

The measurement of human capital, also with reference to elderly population¹

Submitted by ISTAT, Italy

INTRODUCTION

1. The development of human capital is a strategic resource and, therefore, a key priority for the development of social cohesion and competitiveness in the knowledge society.
2. Actually, at least since the 1960s, human capital has played a key role in economic research, being used to explain people's behaviour both in the field of education, labour market and, above all, in the field of the theories of economic development and growth where human capital is considered as the main economic resource of a given society, with equal or more importance than physical capital.
3. This is the reason why it is fundamental to have proper indicators to measure the level and variation (development) of the human capital of a given population or part of it. These measures could then be used to make National Accounts estimates, comparisons over time, comparisons

¹ This paper has been prepared at the invitation of the secretariat.

both at international and territorial level (inside a country) as well as to analyse the impact of human capital on competitiveness and economic growth.

4. However, despite the growing attention, the concept of human capital has been given many different definitions by several authors without reaching a completely and commonly-shared theoretical basis. Above all, many problems have arisen concerning its measurement due to its multi-dimensional nature and the micro or macro levels of analysis. As a result, empirical measures and analyses are not much developed yet.

5. In order to identify possible operative definitions of the statistical indicators to measure the level and development of human capital, we deem it useful to recall, in brief, theories, concepts and definitions of human capital, generally stated at various levels and to set out the main proposals put forward for measuring and analysing it. Special focus on the human capital of the elderly population will be given.

I. THEORIES, CONCEPTS AND SOME TYPES OF ANALYSES OF HUMAN CAPITAL: THE MULTIFACED ASPECTS

6. The theory of human capital worked out at the beginning of the 1960s by Schultz, (1961), Mincer (1958 and 1970) and Becker (1962 and 1964) has considerably developed in various directions which cannot be summed up here.

7. The theory – or rather the theories – on human capital have provided, however, scientific justification to two convictions: for each individual, the level (or stock) and development (or changes) of human capital bring about a different level and development of his/her earnings and income (the same goes for families); for economy, as a whole, they bring about the country's development level and its economic growth (the same goes for enterprises).

8. Thus, from a microeconomic point of view, the human capital of an individual is one of the main factors influencing success in the employment sector. It is pivotal to invest in training since it gives people better access to employment, besides the chances for career advancements and improvements in their professional and salary (economic) conditions. From the macroeconomic point of view, the country's competitive capacity and its production system depend on the accumulation rate and the investments in physical capital, as well as on the investments in human capital and on the knowledge embodied in it.

9. In the light of the positive effects that investments in education and training have on labour productivity, for a country the human capital is as crucial as the economic growth, just like progress in technology. Recent theories on human capital emphasize that also the quality of work affects the production process and economic growth. In fact, the physical capital, is made up of goods, which, in turn, are the result of human work. Hence, technology constitutes the real economic potential of the available resources, that is nothing but human knowledge applied to production. Therefore, the higher the quality of work allowing for the creation of new technology and a correct use of it, the greater the process of development.

10. And last, since investments in human capital should also positively affect health, crime and

social cohesion, the social impact of its development is deemed to be even more relevant than the impact - measured in economic terms - on productivity.

11. Measurement experiences referring to the theories on human capital at the individual level have been developed since the 1960s, when Becker (1964) realised that rational individuals compare the costs and benefits associated with the gaining of human capital. In case of perfect information, individuals invest in their own human capital when the marginal benefit of an investment (additional earning in its working life) exceeds the marginal costs of the investment itself. In this framework, the theory of human capital aims at examining how a single worker chooses to allocate his/her time to training (through schooling or training on the job) and job, in view of maximizing the income expected from the use of this capital. In this context, the so-called Mincer Equation (named after Mincer's work in 1970) allows for estimating the rate of return to schooling/education starting from a cross-sectional analysis of incomes in a representative population sample. This is one of the most often used indicators in economy, where individual wage is a function of individual variables, such as the years of schooling and working experience. As a general rule, the higher the human capital of individuals, the higher their incomes and the better their ways of living. If human capital is to be defined as the skills that individuals keep or develop through either education or vocational training and supply on the labour market in exchange of being paid, wage differentials are the way in which the market boosts the workers' human capital. Wage differentials provide a measure of current financial benefits that an individual has to invest in continuing to study in a given country and, at the same time, contribute to determine the system of benefits enabling people to choose the proper investment in human capital.

II. DEFINITIONS AND MEASURES OF HUMAN CAPITAL

12. The above-mentioned analyses do not provide a measure of human capital. Furthermore using a single indicator (e.g. the educational attainment) as a proxy turns out to be inadequate or even misleading.

13. There are several definitions of human capital at various levels (individual, family, enterprise, country). However, in our context it seems to be useful to refer to the general definition of human capital quoted in an OECD well-known paper issued in 2001 (OECD, 2001), i.e. "the knowledge, skills and competencies, attributes embodied in individuals that facilitate the creation of personal, social and economic well-being". This is clearly a definition that refers to the manifold features of human capital and to the factors influencing its level and evolution.

14. Human capital is determined by and increases with formal education and training, as well as with other forms of learning stemming from social networks. On the one hand education meant as gaining knowledge, skills and competencies is the key factor influencing human capital, on the other hand, many other specific and contextual factors can influence the development of human capital both at the level of individual and of a group of individuals (e.g. enterprises, territorial areas, a country as a whole). Moreover, learning permeates individual life, occurs throughout a lifetime and does not concentrate only on formal education or training. Learning takes place within a family or with one's peers, at one's working place, during informal learning in everyday life or through civic engagement. For example, the level of local economic

development can affect the development of the human capital of people living in those places. Some of the authors have also underlined that the cultural environment in which learning takes place is pivotal. Undoubtedly, there is a mutual relationship between human and social capital, the latter being meant as endowment of relational goods (i.e. networks and social relationships)

15. In conclusion, the influence of information must not be neglected. In modern societies, to enhance human capital, education has to be accompanied by a constant and adequate information flow; therefore the access to information is also a strategic factor for the development of human capital.

16. For this reason, publications of international organisations (in particular UN, OECD, Eurostat) have a lot of information about the most important indicators of human capital. In recent years some of them have been included in the structural indicators which Europe relies on for the measurement of its economic and social evolution as laid down in the Lisbon strategy and its successive revision.

17. Alternative, and more qualified, methodological approaches have recently been introduced (in particular by OECD). They rely on individual competencies and on surveys (e.g. PISA and IALS) which, unfortunately, measure only some of the aspects of skills and competencies and are subject to the limits inherent to these kinds of sample surveys carried out in different institutional and social contexts in various countries. Many of the most recent analyses of human capital in various countries are based on the results of these different indicators, since there is not a single indicator.

18. Actually, as Dagum very well highlighted (1996 and 2000), human capital is a latent variable (i.e. it cannot be directly measured). It depends on several factors and represents the abilities an individual (family or country) has to generate income. In order to get a single and valid indicator, estimates have to focus on these abilities. A new methodology is being proposed. In compliance with economic theories, it would allow to quantify human capital at the household and individual levels in a given social framework as a multidimensional set which is not observable (non-observable composite variable). The set is generated from the investment in education and direct training on the job that are big enough to cause an increase in working abilities that can be measured by an increase in the income gained and the wealth accumulated by an individual over his/her lifetime. In this regard, some experiments have been carried out by using data from a sample survey on household income to get an estimate of the household human capital (Dagum, Vittadini, Costa, Lovaglio, 2003).

19. As a general rule, the concept and the corresponding indicators of human capital have been almost exclusively applied to evaluate the possible contribution of an individual or a group of individuals to the economy of a community. More recently it has been suggested to use the concept of human capital also to measure the differential effect - in terms of labour and/or income - coming from the investment in education, for special segments of educational paths. This implies that the definition be target-oriented and namely: "a non-observable variable obtained through an ad-hoc combination of a set of indicators concerning the result of the investment in education, in terms of working ability". The indicators reflecting these effects can not necessarily be expressed in monetary terms. It is obvious that the operational definition is relevant because it links the object to be assessed to the objective conditions in which the very

phenomenon occurs. It is still an emerging research sector, but it is very promising.

20. In the end, other measures concerning human capital draw one's attention to the economic assessment of investments in human capital, which aims at analysing how financial and human resources employed in educational training contribute to the enhancement of the economic output as a whole, or the value of an enterprise, in particular cases. Among the experiences of measurement in this field, Human Resource Accounts systems are worth mentioning. Since the 1980s they have been introduced in many Northern European countries to assess the impact of human capital on economic growth (Flamholtz, 1986). At present, the importance on a macroeconomic level of a modern system of accounts for human capital is being increasingly acknowledged (a special session of the seminar is devoted to this subject). Less widespread is the awareness of the strategic role played by the systems of accounts of knowledge, information and competencies at the entrepreneurial level as well as from a macroeconomic viewpoint. Yet, the weight of delays in research on human capital and educational economy depends also on the perception of how adequate the basic models and concepts of this subject matter are. From the point of view of tools for analysis and measurement, we are experiencing a phase of deep re-thinking, criticism and development, and from an application point of view the objective is to estimate the performance rates of the different levels and types of the above-mentioned education and training (Antonelli, 2001 and 2003).

III. A SIMPLIFIED FRAMEWORK TO DEFINE INDICATORS TO MEASURE AND CONDUCT ANALYSES ON HUMAN CAPITAL

21. As it stems from the above-mentioned definitions, and in particular from the OECD definition, for its very nature the concept of human capital is multidimensional and involves objective and/or subjective components, together with aspects that can be largely different: general and specific, silent or encoded, gained through learning or experience or rather coming from innate abilities. As a consequence, it is hard to set adequate measures (indicators) for the various aspects and, above all, to obtain a single synthetic measure. Moreover, there are different measures and analyses depending on the reference level (individual or a country) and on the goal set.

22. In order to define adequate operational statistical indicators it is important, in our opinion, to start from the micro level (individuals), and to shift then to different aggregate levels (families, groups of population, enterprises, country, etc.), describing the problems that should be solved at different levels. In any case, estimates must refer both to the level (stock) and development (flows) of the human capital.

23. For an **individual**, human capital can be measured referring to the following four elements (Gori, 2006): Cognitive skills (Basic, Advanced, Specialised); Non Cognitive skills (Concentration, Compliance, Punctuality, Cooperation, Persistence, Sociability, Networking, Leadership, etc.); Attainment (Years of schooling, Certificates); Other (genetic background, IQ, economic and social contest, etc.).

24. Observations:

- (a) the cognitive skills should be separated in generic skills (such as problem solving,

communication and the ability to work in teams; but this latter is also a non cognitive skill) and specific skills (theoretical knowledge, knowledge of methods, etc.); the first ones can be defined as general academic skills, while the second ones as field specific skills;

(b) the management skills (planning, coordinating and organising , leadership, creativity, etc.) are considered both generic cognitive skills and non cognitive skills;

(c) the non cognitive skills usually are not considered as measures of human capital;

(d) as for the attainment, it is important to consider both formal and informal training; that is the cognitive and non cognitive skills achieved on the job and during the life by lifelong learning and social networks;

(e) it is necessary to distinguish between attainment (how far you go in school or college), the indicator commonly used to evaluate human capital, and achievement (what you have learned, which can be obtained through any valid measurement); it is more important to measure the quality of the training (school) than the number of years spent at school;

(f) skill formation is a dynamic process: therefore, it is important to consider the life cycle of an individual. The human capital usually increases over time; in order to measure it, the achievement performed during the entire school and work life has to be studied and evaluated.

25. At **aggregate** level, the estimation of human capital is obtained summing up the individual evaluations, but various problems have to be solved.

26. Observations:

(a) it is necessary to distinguish between potential human capital (supply side) from actually employed human capital (demand side);

(b) in order to understand the differences between the two above mentioned configurations, the supply-demand matching process of human capital must be investigated, identifying and knowing the link between them, that is how the different types of potential human capital are used and how different is the training process from the experiences requested by the demand;

(c) the evaluation of human capital turnover, accumulated and destroyed, is very important;

(d) valid estimates, comparisons over time and, above all, adequate comparisons among different groups of populations (or countries) depend on the composition of the populations, that is on the availability of separate estimates for homogeneous sub-populations (sub-aggregates); therefore, it is necessary to classify individuals taking into account various variables, like: gender, age, citizenship, living area, and so on;

(e) the classifications of population by age and citizenship are particularly important; in

fact, since the skill formation is a dynamic process, the analysis of the comparisons of human capital between two populations must be made using the analysis by cohorts (longitudinal analysis); this is important also to evaluate policy's impact; moreover, separate estimates for the human capital of immigrants are necessary, because they account for an additional net improvement of human capital for the host country .

IV. THE MEASURE AND ANALYSIS OF HUMAN CAPITAL FOR THE ELDERLY POPULATION

26. With reference to the aging populations, in particular the ones of European countries, due to the decreasing birth-rate and lengthening of average life expectancy, there is a need for focusing on measuring elderly population capital. Actually, the aging process brings about - or can lead to - the lengthening of working life.

27. When dealing with measurement of the human capital of adult or elderly population, it is even more difficult to find adequate indicators that can properly represent its potential human capital, especially when the measures are used to make comparisons among different populations. This is due to two reasons: first, the comparison is made between individuals in the same age GROUPS but belonging to cohorts which are completely different in amount and educational attainment (actually, young people (generations) in a population) are more educated though belonging to less numerous cohorts). Secondly, usually the indicator considers only the formal education attainment, and it is difficult to include the human capital enhancement - stemming from professional or lifelong training - that elderly cohorts have achieved.

28. Some data concerning Italian population can serve as a good example to illustrate this problem and, accordingly, the needs for proper measures and analyses. Data on Italian population show a deep educational gap between young generations having higher education levels similar to the average European ones, and elder generations, whose education levels are far distant from the average in Europe. Moreover, there could be considerably deep differences between cohorts.

29. Data in table 1 refers to percentage of high-school and university graduates over the total population in adult and elderly age classes, as observed in the Labour Force Survey. Series allows to make comparisons between the percentage of people with high education attainment in the 40-44 and 65-69 age classes for 1977 and 2003. From table 1 the following considerations arise and refer to the two different approaches:

30. Analysis by age:

(a) The proportion of people with high education attainment among people aged 40-44 has risen from 10,8% in 1977 to 48,6% in 2003; whereas, the same proportion has risen from 4,4% to 14,5% among people aged 65-69. Therefore, the increase is higher in the younger people and in particular among women.

(b) The proportion of high-school and university graduates out of the total population in the 40-44 and 65-69 age classes for 1977 (it is higher for the younger by 2,5 times) is much closer than in 2003 (where the percent is higher for the younger by 3,3 times).

31. Analysis by cohort:

(a) The levels of high-school and university graduates in the cohorts aged 40-44 in 1977 have further increased throughout the following 25-26 years and in 2003 they account for 1/3 higher.

(b) Therefore, the education attained by people aged 40-44 in 2003 are expected to increase further in the following 25 years and in 2028 the percent of high-school and university graduates among people aged 65-69 will be higher by 50%.

Table 1 – Percent of high-school and university graduates in some age groups out of the overall population in the same age group by sex– years 1977 and 2003

	1977			2003		
	Men	Women	Total	Men	Women	Total
40-44	13,3	8,3	10,8	48,2	49,0	48,6
...						
65-69	6,3	2,7	4,4	17,8	11,7	14,5

Source: Labor Force Survey and demographic statistics

32. These results give a useful hint to debate over the opportunity to carry out analyses by generation or by cohort when making international comparisons and comparisons over time. They can also be used to measure the progress achieved in education in one cohort as opposed to another or among especially significant cohorts, as well as to measure the effect of the progressive decrease in the younger and more educated cohorts due to the decline in births.

V. FINAL REMARKS

33. A lot of work has been done referring to theory, definitions and measurement of the human capital. However, the international and national statistical offices have still to make strong efforts to set adequate indicators and procedures of estimation to get proper and valid indirect measures of human capital. They have to promote also the development of panel databases to conduct valid analyses according to some of the approaches mentioned in the paper.

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