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**A MULTIDIMENSIONAL APPROACH IN THE MEASUREMENT OF
UNDEREMPLOYMENT**

Submitted by ISTAT*

I. CONCEPTUAL AND OPERATIONAL DEFINITIONS

1. Underemployment is one dimension within quality of work statistics. The time-related underemployment rate is in fact one of the core indicators within ILO's decent work framework, fitting within three different dimensions: employment opportunities; adequate earnings and productive work; decent hours (Anker 2000). Aside from a worker's perspective, where earnings are adequate only if a sufficient number of hours can be worked (among other problems relating e.g. to job satisfaction), there is also a macroeconomic perspective associated with underemployment, where within the labour force framework it becomes an indicator of underutilization of labour resources similar and complementary to unemployment. In fact, statistics on time-related underemployment enrich the analysis of the efficiency of the labour market in terms of the ability of the economy to provide full employment to all those want it, since many workers do not experience a total lack of employment possibilities but rather a lack of adequate employment opportunities.

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2. The topic of underemployment was first considered by the second International Conference of Labour Statisticians (ICLS) in 1925, the first international statistical definition was adopted in 1957 and the last resolution by the 16th ICLS in 1998. Time-related underemployment according to this resolution refers to “insufficient hours of work in relation to an alternative employment situation that a person is willing and available to engage in”. Operationally it identifies employed persons (15 year of age or above) who in the reference week were willing to work additional hours; were available to work additional hours; had worked less than a threshold relating to working time. The threshold is determined nationally, for example in terms of what is considered a full-time job: in Italy it is 40 hours (see section 2 for details). This definition fits within the labour force framework – a person’s willingness and availability are essential components. This subjective element of choice is also important from the point of view of the quality of work.

3. Other forms of underemployment are more difficult to measure. In the 1998 resolution they are referred to within “inadequate employment situations that affect the capacities and well-being of workers”. The resolution in this case contains suggestions for indicators but no operational definitions as for time-related underemployment. Distinction between time-related underemployment and inadequate employment situations was in fact largely based on considerations of the current practical feasibility of measurement more than on conceptual grounds (ILO 1998a). Persons in inadequate employment situations are those in employment who during the reference period want to change their work situation/activities/environment for a set of reasons chosen according to national circumstances, e.g. inadequate use and mismatch of occupational skills, inadequate income, excessive hours. Prior to 1998, time-related underemployment was referred to as visible underemployment, while inadequate employment situations contains what was once referred to as invisible underemployment, which reflected a misallocation of labour resources.

4. Countries so far have concentrated on measuring time-related underemployment, if at all, on the basis of responses to national Labour Force Surveys, given the complexity of measuring inadequate employment situations and the lack of an agreed international definition. Still, according to data collected by ILO on labour statistics sources and methods (ILO 2004), limiting our analysis to OECD countries, we can see that not all countries follow the international definition of time-related underemployment, with concerns relating to comparability. Of the 27 OECD countries for which updated data exists, 5 countries do not have data on time-related underemployment, 7 countries define it as involuntary part-time, and while 12 countries use the willingness criterion, only 8 consider availability (Australia, Denmark, France, Ireland, Italy, Norway, Portugal, Switzerland). In a few countries persons need to be seeking a job with more hours (in alternative to be willing to work more hours). A threshold is rarely indicated.

5. Concerning indicators of inadequate employment situations, 16 of the 27 OECD countries with data state not to have any. The rest follow the ILO indication of defining persons in inadequate employment situations as those who are searching for a new job for a set of reasons which vary widely by country (e.g. better conditions, commuting situation, use of skills, risk of losing present job, income).

6. In this paper we will illustrate how we define time-related underemployment (section 2) and skill-related underemployment (section 3) – the latter an important type of inadequate employment situation which fits within the concept of underemployment – studying the two dimensions jointly in section 4.

II. TIME-RELATED UNDEREMPLOYMENT

7. The starting point in identifying the time-related underemployed is the willingness of an employed person to work more hours in the reference week. In line with the framework for measuring the labour force, the measurement of underemployment is based primarily on the current capacities and work situation as describe by those employed, answering questions within the Labour Force Survey. Reference to the same week used to identify the conditions relative to the employed makes it possible to construct indicators of underemployment, which are coherent with those on employment. Secondly, to determine the availability of the employed person to work those additional hours wanted, the questions asks whether one is immediately available to work more hours. But sometimes a person states not to be immediately available because of the notice he or she needs to give in order to be able to change job, and not because of other private reasons (such as family, study, illness etc.): these are classified as available. Another special case are those who have worked less than usual because of illness, strike, compulsory maternity leave, or study not organized within one's job. In these cases, in fact, because of personal reasons, the person was actually not available to work more hours in the reference week, so he or she is classified as not available whatever the answer to the question on immediate availability. In 2004 in Italy persons in employment were 22 million 404 thousand. Of these, 1,344,000 (6%) stated to be willing to work more hours in the reference week. Most of these (1,050,000) stated to be immediately available¹.

8. Among persons in employment willing and available to work more hours, the next step is to determine a threshold of hours above which an individual cannot be classified as in time-related underemployment. There is not much agreement between countries in the choice of criteria to determine the threshold. The ILO 1998 Resolution states in fact that the threshold should be chosen according to national circumstances, and that it may be determined by e.g. norms for hours of work as specified in relevant legislation, the boundary between full-time and part-time employment, averages. There is also not much agreement in the choice of variable to use for determining the threshold: actual hours, usual hours or a combination of the two. Lastly, when using an empirical criterion, the statistic to use has to be chosen.

9. The Council directive 93/104/EC concerning certain aspects of the organisation of working time and later amendments² recommends not to work more than 48 hours a week. This value is therefore used as limit in calculating a threshold for time-related underemployment. On the other hand we think it is more useful to establish a threshold using an empirical criterion based on mean or median hours worked, chosen on the basis of the stability in time and the exclusion of those that have a normal working time. We examine five variables in the four quarters and the whole 2004: *i*) actual hours in the reference week; *ii*) actual hours in the reference week excluding the employed who did not work during the week (absent); *iii*) usual hours in a week; *iv*) the combination of usual and actual hours, considering usual hours for the employed who did not work during the reference week and actual hours for the rest (*mix1 hours*); *v*) the combination of usual and actual hours, considering usual hours for the employed who worked less than usual during the reference week for non-economic reasons and actual hours for the rest³ (*mix2 hours*) – see Table 1.

¹ Among persons in employment available to work more hours, those which are excluded because in the reference week have worked less than usual because of illness, maternity leave, strike, study are 68 thousand, those included because they had to give notice to change job were 3 thousand.

² Directive 2000/34/EC of the European Parliament and of the Council, 22 June 2000; European Parliament document A5-0026/2004 of 29Jan. 2004 on the organization of working time (revision of the directive 93/104/EC).

³ The substitution of actual with usual hours was made for the employed who had worked less than usual for the following reasons: illness, holiday, festivity, study, maternity leave and family reasons.

Table 1 – Mean and median of hours worked

Variable used	Mean				Year 2004	Media n*
	I quarter	II quarter	III quarter	IV quarter		
Full-time employed						
average actual hours with absent	38	40	34	38	37	40
average actual hours without absent	40	41	41	40	41	40
average usual hours	40	41	41	40	41	40
average mixed hours all absent	41	42	42	41	42	40
average mixed hours some reasons	41	41	41	41	41	40
Total employed						
average actual hours with absent	35	37	32	36	35	40
average actual hours without absent	38	39	39	38	38	40
average usual hours	39	39	39	39	39	40
average mixed hours all absent	39	39	39	39	39	40
average mixed hours some reasons	38	39	39	38	38	40

** in the four quarters and in the annual average the median has always the same value*

10. As in the framework used to determine those in employment, the variable which is most suited to determine the threshold is hours actually worked during the reference week. But being a continuous survey, the mean of hours worked is conditioned by seasonal factors. In particular, during the 3rd quarter in August many Italians are on holiday. Therefore the use of this variable for calculating the threshold produces a large variability between quarters, and an incoherency between mean calculated on a single quarter and on the whole year. The mean of actual hours excluding the employed who are absent from work is more stable, but leaves out a portion of persons in employment that varies from one quarter to the next. The mean of usual hours worked during a week, instead, is more homogenous, with just a few differences between quarters for full-time workers. But in this case hours worked does not relate to the reference week, to which the question on willingness to work more hours refers. Therefore we do not use this variable to determine the threshold. Lastly, the use of a variable which combines the information on actual and usual hours makes the value only partly more stable and makes the threshold higher for the full-time employed.

11. The use of the median for calculating the threshold, instead, gives stable results. In fact, the value of the median is always the same in all quarters and in the year for all variable analysed. In this case there are no seasonal variations due to workers on holiday or who work less than usual in some periods. In fact, the median value corresponds to the modal value. In Italy 40 hours is the standard working time for most workers: in 2004, 30% of all persons in employment worked 40 hours. For this reason the median for all those in employment is the same as for those employed full-time only. So a threshold of 40 hours is a reasonable value for Italy, in order to exclude extreme cases and include a large portion of those that say they would be available to work more.

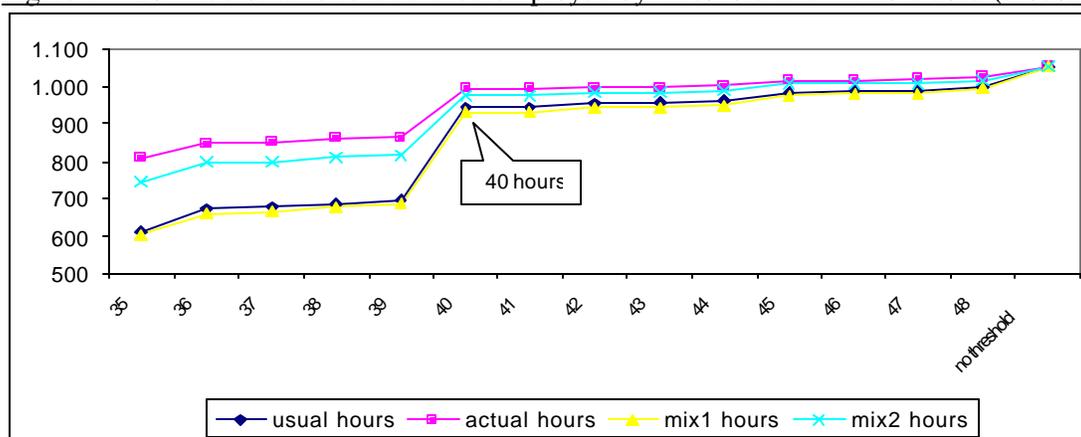
12. In Table 2 and Figure 1 the different estimates of time-related underemployment are shown for each threshold from a minimum of 32 hours (mean of actual hours of 3rd quarter).

Table 2 – Estimate of time-related underemployed by threshold and variable used (thousands)

Value of threshold	usual hours	actual hours	mix1 hours	mix2 hours
32	587	778	573	712
33	589	782	576	716
34	591	786	579	720
35	612	805	602	743
36	672	848	662	797
37	676	851	666	800
38	688	861	679	812
39	694	865	685	817
40	945	992	931	975
41	945	992	932	976
42	955	997	943	983
43	957	999	946	985
44	961	1,003	951	989
45	986	1,016	977	1,006
46	987	1,017	979	1,007
47	987	1,018	979	1,008
48	999	1,026	992	1,017
no threshold	1,050	1,050	1,050	1,050

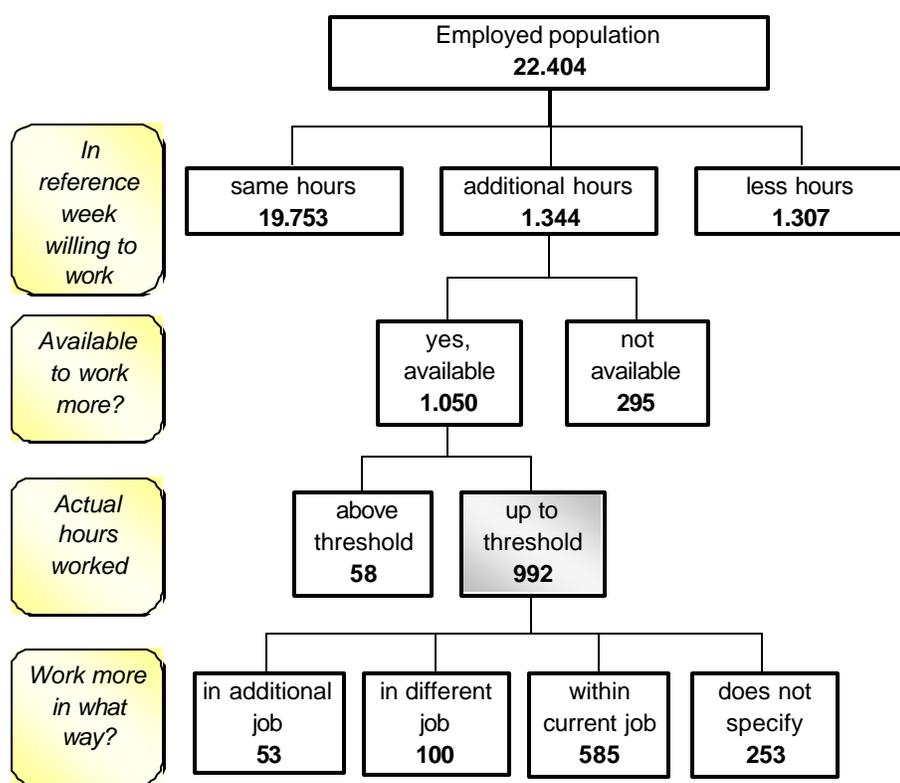
13. As we can see, if we include all those who worked up to 40 hours in the reference week, the estimates are similar for all four variables. Secondly, with the 40 hours threshold the estimates are quite similar to the ones using the legal 48 hours threshold, and not too different from the one obtained without threshold at all (useful for international comparisons). If we exclude those that worked 40 hours, the estimates become much lower (especially for actual hours) and differ more according to the variable used. So we chose the threshold of the median, 40 hours, and the variable of actual hours worked during the reference week, to use the same reference period as in determining the employed and their willingness to work more. In this way persons in time-related underemployment in 2004 were 992 thousand, 4.1% of the labour force.

Figure 1 – Estimate of time-related underemployed by threshold and variable used (thousands)



14. Figure 2 shows the main steps taken in estimating the time-related underemployed, as well as information on the ways in which the underemployed are willing to work more. In 59% of cases, the underemployed want to work more hours in the same job, indicating an insufficient demand for labour in the occupation. In 10% of cases the underemployed would like to work more by changing job: to the discontent in terms of hours is added the discontent with the job itself. Following the ILO 1998 Resolution we do not define the time-related underemployed using the criterion of job search, which would exclude those who wish to work more hours in the same job. But 35.3% of the time-related underemployed state that they are looking for a job, vs. 7.3% of the employed; among the underemployed who would like to work more hours by changing job, the vast majority (77%) state they are looking for a new job.

Figure 2 – Flow-chart for determining persons in time-related underemployment (thousands)

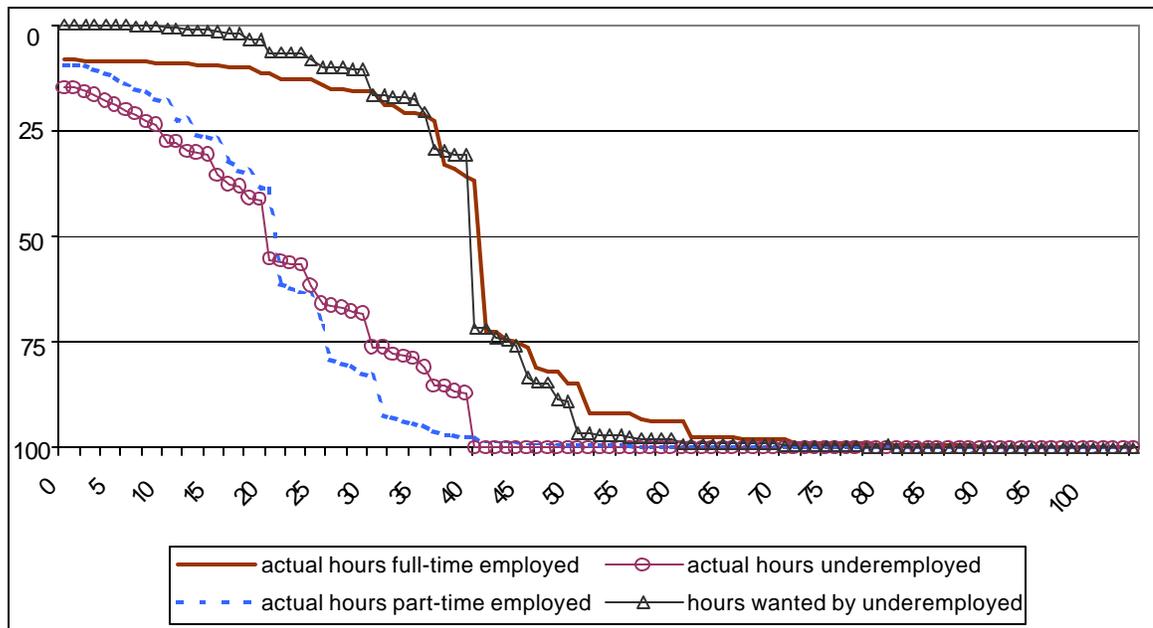


15. Other elements characterize the time-related underemployed. Firstly, on average in 2004, the underemployed who have not worked at all in the reference week are almost double of all the employed (14.4% vs. 8.4%) and 38% of the underemployed have worked less than usual in the reference week (vs. 17.2% of the employed). In these cases underemployment is connected to lack of work in certain specific periods. In fact the majority (57.7%) of the underemployed who worked less than usual in the reference week would like to work as usual (and no more) and 15.4% state that usual hours are very variable. On the other hand for the majority of the underemployed (58.9%), hours worked in the reference week are as usual. In these cases underemployment is not tied to specific periods of unfavourable economic cycle.

16. In order to evaluate the extent of insufficient demand for labour, we compare hours worked with hours wanted in the reference week (Figure 4). The majority of the underemployed (55.1%) worked at most 20 hours in the reference week, 24.6% worked 21-35 hours and only

18.5% worked 36-40 hours. On the other hand wanted hours are concentrated between 36-40 hours (52%) and 41 or more (25.7%). Comparing with hours worked by all persons in employment, we can see that hours worked by the underemployed are at first similar to those worked by the part-time employed, and just a few hours more in the last 25% of the distribution. Hours wanted by the underemployed, instead, are very similar to hours worked by the full-time employed except in the first part of the distribution, where hours wanted are more. In these cases it is mainly full-time employed persons who worked less than usual or were absent in the reference week.

Figure 4 – Distribution of hours worked in the reference week by the employed and by the underemployed and hours wanted by the underemployed



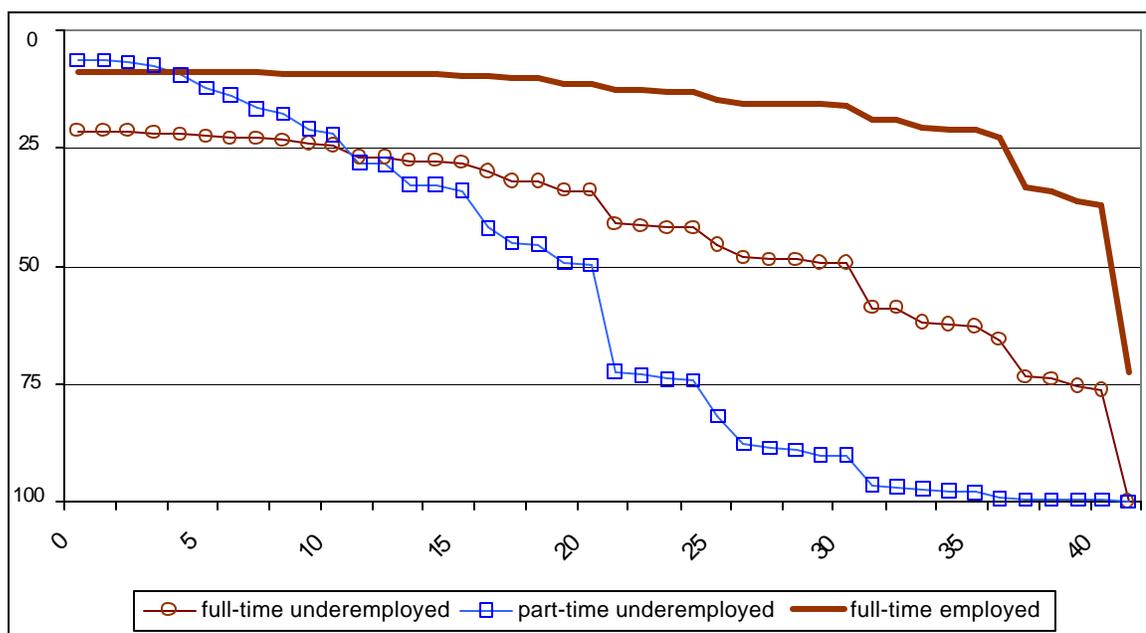
17. These results indicate that the time-related underemployed are mainly part-time workers who would like to work full-time. But part-time employment was not among the criteria used in the definition of time-related underemployment, for various reasons. Firstly, there is no international definition of part-time work: the distinction is based on the interviewee classifying himself, especially for the self-employed. Secondly, the distinction between part-time and full-time work is not based on hours worked in the reference week. Using this variable rather than hours worked excludes all those who usually work full-time even if in certain unfavourable periods work less for economic reasons (cyclic underemployed), and full-time workers in occupations with less hours than normal. Therefore involuntary part-time is less suitable to describe time-related underemployment. In fact, crossing the time-related underemployed with the involuntary part-time (Table 3), we see that the two indicators do not overlap much: only 358 thousand are classified in the same way (36.1% of the underemployed and 35.3% of the involuntary part-time).

Table 3 – Overlap between involuntary part-time and time-related underemployed (thousands)

	Time-related underemployed		total
	yes	no	
Full-time	541	19.022	19.563
Involuntary part-time	358	656	1.014
Other part-time	93	1.735	1.828
Total	992	21.413	22.404

18. Even if almost all the underemployed who work part-time (79.4%) work involuntary part-time, there are as many as 541 thousand (54.5%) who state to be working full-time. But hours worked in the reference week by the latter are much less than by all full-time workers (see Figure 5). Also, 21.5% of the full-time underemployed were absent from work in the reference week, and 33.1% worked less than usual. Again, underemployment is related to certain specific periods.

Figure 5 – Distribution of hours worked in the reference week by persons in underemployment working part-time and full-time and by all persons in full-time employment



19. Keeping in mind that the definition of full-time work varies according to the occupation, the variable hours worked is more stringent and homogenous compared to the definition of part-time/ full-time work, considering also the variability of working time in different periods of the year. Also significant is the 656 thousand classified as involuntary part-time but not underemployed. Most of these (92%) state they would like to work the same number of hours during the reference week, even though they state that they work part-time because they could not find a full-time job.

III. SKILL-RELATED UNDEREMPLOYMENT

20. Time-related underemployment on its own does not measure the full-extent of underemployment. One important type of inadequate employment situation which fits within the concept of underemployment is skill-related underemployment, whereby it is the skills rather

than the time of workers which is underutilized, with consequences to the quality as well as the productivity of work, creating problems both at the individual level and at the level of the economy as a whole.

21. As well as there being a lack of an internationally approved definition, inadequate use of skills is difficult to measure and proxy indicators need to be used. Here too we start from the statement of the worker on whether he is looking for a new job and available to change, as well as using an objective criterion indicating mismatch between occupation and skills. The match of a worker to a job usually involves a variety of factors, some of which are harder to measure than others: training, education, experience, as well as aptitudes, abilities, attitudes or preferences (Fritsma 2000). We will use a simple definition of mismatch, identifying the overqualified according to the level of education on the basis of the indications of the International Standard Classification of Occupations (ISCO) for major groups of occupations. We will not take into account a mismatch relative to the field of education. This is another problem on its own: according to a Eurostat study in 12 EU countries (2003), for example, Italy had the highest rate of job mismatches among school leavers⁴ (47%), and in the country with the lowest rate, the Netherlands, it was still almost a third of all school leavers (29%).

22. Hence, to use an operational definition coherent to time-related underemployment, where a person's willingness and availability to change the amount of hours they work are essential components, we start by identifying those who subjectively feel the inadequacy of their current job on the basis of their reply to the question on whether they are looking for a new job. In fact, we cannot assume that all those who have a higher level qualification than their occupation requires (according to ISCO) would choose to have a different-level job if they could. We consider all those who are looking for a new job, independently from the reason. As we saw earlier, the resolution adopted in 1998 by the 16th ICLS identifies persons in inadequate employment situations as those in employment who during the reference period want to change their work situation for a set of reasons (in this case the reason would be inadequate use/mismatch of occupational skills). But in the Italian Labour Force Survey the question on reasons for looking for a new job is not multi-response: the reason indicated is the main one. For example, a person on a lower level job than their qualification would allow them may want to change mainly to earn a better income, but the mismatch may be a secondary motive. Secondly, the question on reasons puts together in the same answer actually two reasons: to find a better qualified job and career advancement, which can therefore not be separated. So we take all those who are looking for a new job, for the willingness to change, using an objective criterion to determine the skill mismatch. (But we will see what would change if we were to use an alternative definition.) In addition, we select only those who are immediately available to start a new job within two weeks, as for time-related underemployment, but including those that are not available because they need to give a longer notice before leaving their current job (59 thousand).

23. To determine the mismatch of education and occupation using an objective criterion, in the sense that we are not asking the workers themselves now, we therefore use the definitions contained in ISCO. The objective criterion corresponds to the use of a threshold in determining time-related underemployment. We classify as in mismatch any person with a university-level degree in major occupational groups 3 to 9 (Technicians to Elementary occupations), and any person with an upper secondary school diploma in major occupational groups 4 to 9 (Clerks to

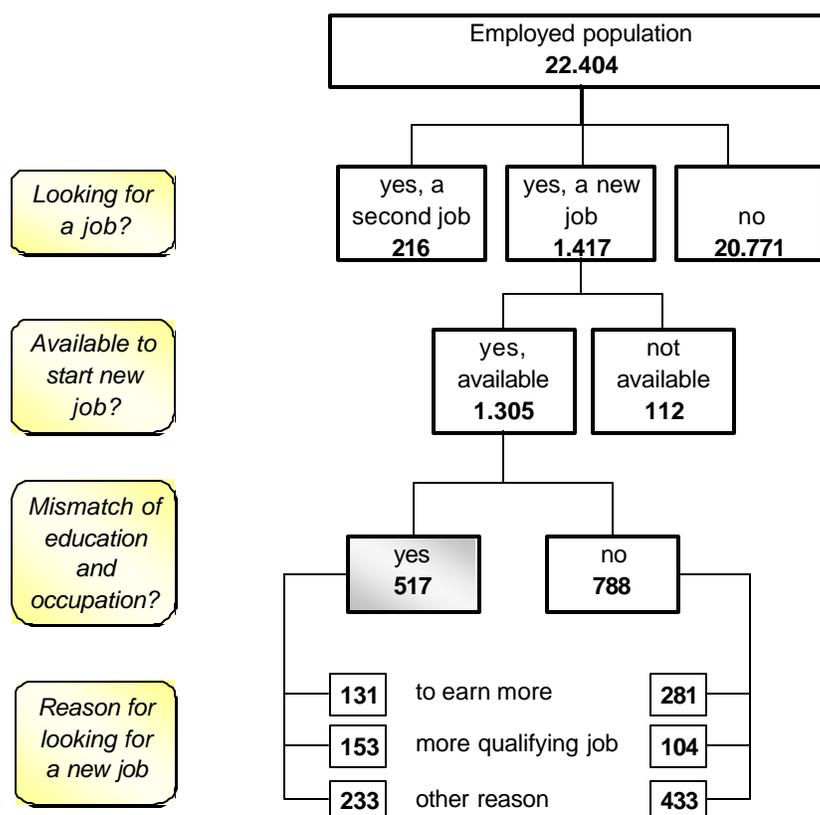
⁴ School leavers are defined as persons aged 15-35 who left initial education within the past ten years (five years in Finland, the Netherlands and Sweden).

Elementary occupations)⁵. Of the 517 thousand persons (2.3%) who are classified as in skill-related underemployment in 2004 according to this definition, combining a subjective with an objective criterion, 413 have an upper secondary school diploma (4.2% of those in employment with a diploma) and 104 a university-level degree (2.3%). Figure 6 shows how we determine the skill-related underemployed step by step.

24. A more ample definition would include those who, even if they do not have an “objective” mismatch, say that the main reason for looking for a new job is to find a more qualifying one (which would make a total of 621 thousand). Another reason which could be added is to earn more, inadequate income being one of the indicators of underemployment on the side of productivity (totalling 902 thousand). On the other hand, among those who do have a mismatch of education and occupation, a more restrictive definition could include only those who say that they are looking for a new job because they would like a more qualifying one or to earn more (284 thousand). In fact, if we do not consider mismatch at all, but only the two mentioned reasons for looking for a new job, the total would be 669 thousand. To be noted is that whilst almost a third of those who are looking for a new job and have an objective mismatch give as main reason to find a more qualifying job, among those who don't have a mismatching job it is less than half this proportion.

⁵ The Italian Classification of Occupations 2001 is closely related to ISCO 88, which distinguishes the following major groups: 1- Legislators, senior officials and managers; 2- Professionals; 3- Technicians and associate professionals; 4- Clerks; 5- Service workers and shop and market sales workers; 6- Skilled agricultural and fishery workers; 7- Craft and related trades workers; 8 - Plant and machine operators and assemblers; 9- Elementary occupations; 0- Armed forces. Major groups 6 and 7 are unified in the Italian Classification. In principle holders of a lower secondary school diploma working in major group 9 (Elementary occupations) should be considered too, but the completion of lower secondary school is now compulsory and that would signify considering no-one suitable for such a type of job.

Figure 6 - Flow-chart for determining persons in skill-related underemployment (thousands)



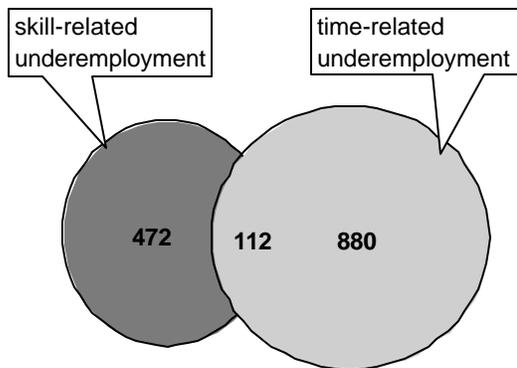
25. Another part of the definition which could be open to debate is how to define mismatch of education and occupation. Given that we have chosen the level of education as a proxy for skill level, and that we take the indications of the Classification of Occupations for major group levels to be correct, if we were not first selecting on the basis of search for a new job there would be six and a half million (more than a quarter of all those in employment) considered to have mismatching education and occupation. In fact, looking at each major group separately, we can see that three out of four persons employed in major group 4 (Clerks) actually do have an upper secondary school diploma. We could take these not be mismatching, but then we would move away from the ISCO indications. An alternative would be to look at each occupation in detail and remove those where the vast majority does have a diploma. But since we do filter to start with, using the subjective criterion of willingness and availability to change job, we consider the wider definition of mismatch to be more appropriate, although further analysis is needed. Now that 57% of persons in employment in Italy have at least an upper secondary degree, and with the growing demand for education, is there a lack on the labour market of jobs suited for the corresponding level of skills of the population? Or is the Classification of Occupations outdated, and many occupations now do require higher level of skills?

IV. COMBINING TIME-RELATED AND SKILL-RELATED UNDEREMPLOYMENT

26. Having determined the time-related and skill-related underemployed, the following step consists in studying the two dimensions jointly. First of all we look at the overlap between the two dimensions. In total, 1 million 464 thousand persons (6.5% of all those in employment) are classified as underemployed in at least one dimension. Of these, 122 thousand are underemployed

in both dimensions, 880 thousand only time-related and 472 thousand only skill-related (see Figure 7).

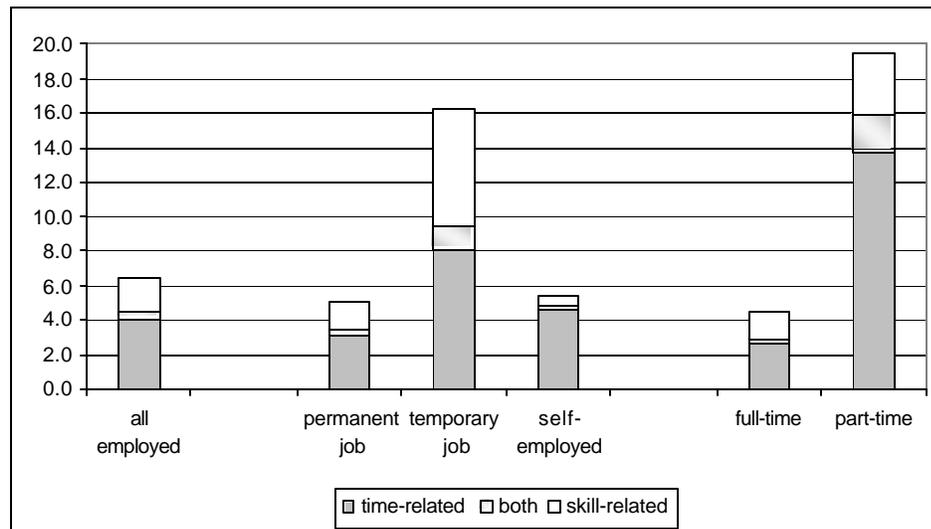
Figure 7 – Combination of time-related & skill-related underemployment (thousands)



27. The small overlap does not surprise given that most time-related underemployed want to work more hours in the same job, while skill-related underemployed by definition are looking for a new job. Therefore in the study of underemployment it is better to keep the two dimensions separate, especially in order to analyze in what type of work these forms of underemployment are more frequent, and to study the socio-demographic characteristics of the underemployed.

Concerning the first aspect, the proportion of underemployed in both dimensions is higher among employees with temporary jobs. Time-related underemployment is very high among part-time workers (15.9% vs. 2.8% among full-time), while for the skill-related underemployed the differences are less (5.7% and 1,8% respectively).

Figure 8 – Proportion of time-related and skill-related underemployed by type of work



28. Considering the sector of economic activity, the proportion of time-related underemployed is higher in agriculture (5.8% vs. 4.4% in industry and service activities), while for skill-related underemployed it is higher in service activities (2.6% vs. 1.6% in agriculture and 1.9% in industry). Considering occupation, differences between the two forms of underemployment are even more striking (see Figure 9). Time-related underemployment concerns mainly elementary occupations (10%), while skill-related underemployment is more frequent among clerks (5,2%).

29. As we can see, the two forms of underemployment are associated with different worker profiles. There are significant differences also in main socio-demographic characteristics. Underemployment in general is more frequent among women and young people (see Figure 11).

30. Women are more frequently underemployed in both dimensions: 5.1%, vs. 4% for men, in time-related and 3.2%, vs. 1.7% for men, in skill-related underemployment. Among the young, often at first work experience, skill-related underemployment is quite high (4.7% for 15-34 year-olds); on the other hand there are no differences by age among the time-related underemployed, except for age group 65 and over, where it is lower.

Figure 9 – Proportion of time-related and skill-related underemployed by occupation group

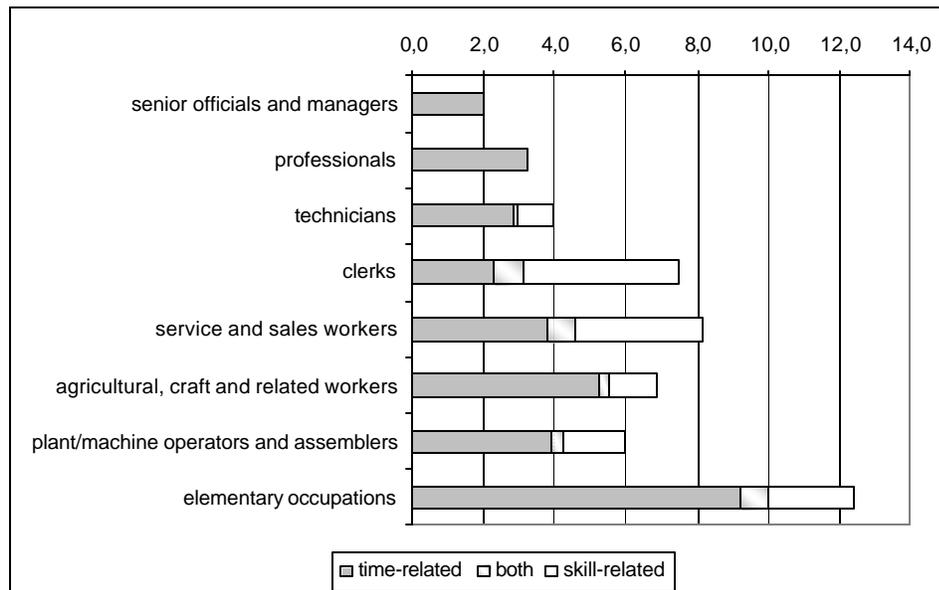
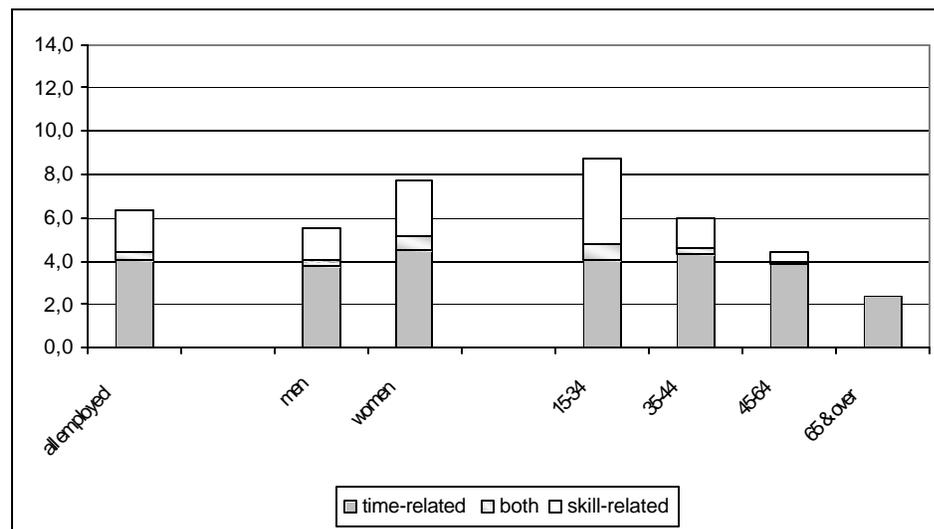


Figure 10 – Proportion of time-related and skill-related underemployed by sex, age and citizenship



31. In synthesis, underemployment is associated with some forms of atypical work (temporary and part-time jobs) and with those traditionally weaker on the labour market (women and young people).

32. For a more complete analysis of underemployment, and inadequate employment in general, we should consider also other dimensions, particularly income-related

underemployment. This dimension is associated to those examined in this paper only in part. In fact, time-related underemployment does not include those who, even if working many hours, have a low income. Skill-related underemployment is not always associated with income; in fact some highly qualified occupations, for example research and university jobs in Italy, have lower income compared to other less qualified occupations.

33. But there are measurement problems associated with income, since interviewees are often reticent on this matter (especially the self-employed). To be coherent with the criteria used in the other dimensions, in fact, we need a variable on earned income in order to establish a threshold of adequate income, above which a person cannot be classified as in income-related underemployment. If we consider only the main reason for searching for a new job (“to earn more”) we do not distinguish those who already have a high income from those who are underpaid.

34. Also, in order not to overlap the income-related dimension of underemployment with the time-related one, we should consider the hourly income rather than the total. In fact, a low income connected to a low number of hours worked is a characteristic of time-related underemployment. Further analysis on this point would be to distinguish those who would like to work more hours but only if paid more than their normal hourly rate (as overtime), from those who want to work more even if at the same hourly rate.

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