MEASURING LABOUR MARKET INTER-TEMPORAL MOBILITY IN ITALY: THEORY AND EVIDENCE

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1. Introduction

Mobility is an important concept in social sciences and economics. It usually refers to the evolution over time of a given socio-economic status of individuals or families in a society. Most of the studies focus on mobility in the following status: income, wealth, wage, education and social class (see, among others, Maasoumi, 1998; Fields and Ok, 1996, 1999; Van de gaer et al., 2001; Van Kerm, 2004; D'Agostino and Dardanoni, 2009; Cowell and Flachaire, 2011). As a consequence, the measurement of mobility has been addressed from different approaches.

Two are the main approaches developed in the measurement of mobility: either (i) in terms of individual status or (ii) in terms of individual position in the status distribution. In the former case, individual mobility depends only on the individual's status over time. The latter concept of mobility, instead, involves also the society and the individual's relationship to the society (Cowell and Flachaire, 2011; Dardanoni, 1993); it is the so-called rank mobility, according to which status is an ordinal concept (positions rather than levels of the variable of interest are used to evaluate individual status). However, the measures that follow this second approach are not decomposable by sub-groups (Cowell and Flachaire, 2011).

Another important distinction in the mobility measurement is between intergenerational and intragenerational mobility. In the former case, a comparison is made between a parent and his/her child, monitoring how the distribution of the individual status of interest changes between different generations in a given society. In the latter case the same individual is compared at two (or more) different dates, and the changes in the distribution of the individual status are measured over a given period of his/her lifetime; see, among others, Van de gaer et al. (2001).

Focusing, in particular, on income mobility, Fields (2007) provides an interesting taxonomy of the different mobility concepts used in the literature. Measuring income mobility means measuring income movements, and five are the different types of movements considered in the literature: (i) positional movements,

that are movements of individuals among various positions in the income distribution (also referred as rank mobility); (ii) share movements, that are income's rises or falls in comparison to the mean; (iii) non-directional movements, which capture the extent of fluctuation in individuals' income; (iv) directional movements, which "gauge the extent of fluctuation in individuals incomes" when "the observer cares not only about the amounts of the income changes but also about their direction" (Fields, 2007, p.3); (v) mobility as an equalizer of longer-term status, focusing on the effect of individual income changes on income inequality.

Typically, mobility analysis refers to two-period mobility, and few are the analysis involving a longer span of time.

Aim of the paper is, therefore, to extend the concept of mobility towards an inter-temporal framework, by looking at the history of the individuals for more than two periods of time.

A new class of indices of inter-temporal intragenerational mobility is here proposed, according to which individual mobility depends only on the individual's status over time (both directional and non-directional movements).

Therefore, the novelty of the paper is to look at non-directional movements as well as at the direction of individuals outcome path, defining as inter-temporal mobile those individuals whose condition is changing over time. In particular, both up-ward and down-ward movements are taken into account.

The new class of indices can be considered an inter-temporal generalization of some of the existing indices of mobility; in particular, when focusing on two-period analysis, the index proposed can be traced back to the family of the Fields and Ok (1996, 1999)'s mobility indices.

Also, introducing individual comparisons with own history, the issue of how to discount past positions arises. In fact, when an individual compares his/her current situation with his/her past, memory plays an important role, and an individual is usually less affected by a remote experience then a more recent one. Time-discounting results in valuing past outcomes less than the same level in the present or without discounting.

In particular, the paper will analyze the inter-temporal mobility of the occupational status in the Italian labour market, through an application of the new class of indices to Italian Compulsory Communications data.

Most of the existing studies on mobility measurement in the labour market focus on macro-level analysis, mainly based on labour market transition matrices (see, e.g., Formby et al. 2004). Muffels and Luijkx (2008) for example propose an analysis of contract mobility, which measures the mobility between different types of contracts weighted by the share of workers. Analysis at micro-level involves

mainly wage mobility. Thus, the approach proposed in this paper constitutes a novelty in the literature.

The paper is organized as follows: Section 2 presents a new class of individual inter-temporal mobility indices and its properties. Section 3 sums up the individual indices in an aggregate inter-temporal mobility index. Section 4 illustrates a special case of the new measures, that captures the persistence in unemployment. Section 5 illustrates the new indices through an empirical application based on the Italian labour market. Section 6 concludes.

2. An individual inter-temporal mobility index

Three are the main ingredients for measuring mobility: (i) a time frame of two or more periods; (ii) a measure of an individual's status within society; (iii) an aggregation of changes in individual status over the time frame. See Cowell and Flachaire (2011).

Referring to point (i), this paper considers non-standard multi-periods of time (not only two periods).

Moving to the second ingredient, the notion of status is important and it can be defined in several ways, depending on the focus of interest of the mobility study.

For point (iii), I follow Cowell and Flachaire (2011)'s approach in underlying the separation of the status concept from the aggregation method. The aggregate mobility for a given society will be described in terms of individual mobility.

2.1. Framework

The individual status is represented as an ordinal variable X (in the empirical application, it will be the occupational status) that takes values in the ordered set $S = \{s_1, s_2, ..., s_K\}$ of cardinality K, with $s_k \leq s_{k+1}$, $k = 1,2,...,K-1$.

Consider a population of individuals $i=1, 2, ..., n$, $n \in \mathbb{N}$ over periods of time $t_i = (T - p_i,.., T-1, T)$ of length $(p_i + 1)$, where $T \in \mathbb{N}$ refers to today and $p_i \geq 1$ integer. Note that the length of the period of times may vary across the individuals.

Let $x_t^i \in S$ be the status of individual i at time t and let $z_i = (x_{T-p_i}^i, ..., x_T^i)$ be the status profile of individual i over his/her period of times of length $(p_i + 1)$. Each status profile may have different length. Moreover, let Z be the set of the individuals' status profiles.

2.2. An individual inter-temporal mobility index

The degree of mobility of individual i will be evaluated starting from his/her status profile z_i through a function $m_\alpha(z_i) = m_\alpha(x^i_{T-p_i}, ..., x^i_T)$ such that $m_\alpha : Z \to \mathbb{R}$.

Mobility arises on pair-wise comparisons between individual i-th status at time t and at time $t-1$. I denote these comparisons by $\delta_{it} = \delta_{it}(x^i_t, x^i_{t-1})$. Comparisons can be defined in different ways, according to the type of mobility that we want to monitor: non-directional (or overall) mobility, upward mobility, downward mobility. For example, comparisons can be defined as follows:

$$\delta_{it} = \begin{cases} \dfrac{|x^i_t - x^i_{t-1}|}{s_K - s_1} & for \quad non-directional \; mobility \\[2em] \dfrac{max(x^i_t - x^i_{t-1}, 0)}{s_K - s_1} & for \qquad upward \; mobility \\[2em] \dfrac{max(x^i_{t-1} - x^i_t, 0)}{s_K - s_1} & for \qquad downward \; mobility \end{cases} \tag{1}$$

I propose to measure the mobility of individual i by considering the following family of *individual inter-temporal mobility indices*:

$$m_\alpha(z_i) = \frac{1}{p_i} \sum_{t=T-p_i+1}^{T} (\delta_{it})^\alpha \cdot w(t), \tag{2}$$

where $\alpha \geq 0$ is a parameter for the *sensitivity to mobility* and $w(t)$ is a discount factor that gives more relevance to the recent years than to the older ones.

A possible choice of *discount factor* $w(t)$ may be the following:

$$w(t) = \left(\frac{1}{1 + \beta \cdot (T-t)} \right)^{\frac{\gamma}{\beta}} \tag{3}$$

where parameters $\gamma \geq 0$ and $\beta > 0$; see Yi et al. (2006).

Obviously, other specifications are possible for the discount factor and for its parameters.

Under the special case when $\alpha = 0$ and $\delta_{it} = |x_t^i - x_{t-1}^i|$, the mobility index (2) becomes

$$m_0(z_i) = \sum_{t=T-p_i+1}^{T} \frac{1(x_t^i \neq x_{t-1}^i)}{p_i} \cdot w(t), \qquad (4)$$

that is the *headcount ratio of inter-temporal overall mobility*, which counts the incidence of changes in the individual's status, regardless of the size of the changes.

Indices of headcount ratio of inter-temporal upward or downward mobility can be obtained analogously.

For $\alpha > 0$, the index $m_\alpha(z_i)$ is affected also by the intensity of the inter-temporal changes.

For a particular choice of the parameters, that is if $p_i + 1 = 2$, $\alpha = 1$ and $w(t) = 0$, the index proposed in (2) reduces to the Fields and Ok (1996, 1999) family of mobility indices.

The following simple example will help clarify better the index proposed.

Example 1. Let $K = 3$, $S = \{1,2,3\}$, $p_i = 4, \forall i$ and $\alpha = 1$. The individual overall intertemporal mobility may take the following values. If scenario is $z_1 = (1,3,1,3)$ or $z_2 = (3,1,3,1)$ then $m_1(z_1) = m_1(z_2) = 1$. If scenario $z_3 = (1,3,3,1)$ then $m_1(z_3) = 2/3$. If scenario $z_4 = (1,1,1,1)$ then $m_1(z_4) = 0$.

Let us now move to discuss some of the main properties that the individual inter-temporal mobility index satisfies.

1. *Continuity*. The index $m_\alpha(z_i)$ is a continuous function.
2. *Normalization*. The index is normalized, which means that it ranges in [0,1]. The lower bound, $m_\alpha(z_i) = 0$, is reached when an individual never change his/her status over time, that is if $x_t^i = x_{t-1}^i, \forall t = 1,...,T_i$. The upper bound, $m_\alpha(z_i) = 1$, can be obtained if an individual has changed status in every period.
3. *Path-dependence*. The index depends on the relative distance between each status. The path is also relevant for the index, as recent years are evaluated differently from less recent ones (because of the discount-factor).

3. An aggregate inter-temporal mobility index

Synthetic information about the intensity and incidence of inter-temporal mobility in a given country or group is essential to address effective policies; therefore, the aggregation step is crucial, as underlined in Sen (1976).

Here I assume an additive structure, and proceed to evaluate aggregate mobility by taking one person at a time. The aggregate inter-temporal mobility index that I propose is the following:

$$M_\alpha = \frac{1}{n} \sum_{i=1}^{n} m_\alpha(z_i),$$ (5)

where $m_\alpha(z_i)$ is the individual inter-temporal mobility index defined in (2).

Let us discuss some of the main properties that the aggregate inter-temporal mobility index satisfies.

1. *Normalization*. The index is normalized, which means that it ranges in [0,1]. The lower bound is reached when all individuals never change their status over time. The upper bound can be obtained if all individuals change status in every spell.

2. *Monotonicity*. All things being equal, if one individual experiences higher inter-temporal mobility of his status, the societal index increases.

3. *Anonimity*. Any exchange among individual inter-temporal mobility profiles, by which the same mobility sequence moves from one person to another, does not affect the aggregate index.

4. *Independence*. Individual mobility profiles provide an independent contribution to the aggregate inter-temporal mobility index.

5. *Population proportionality*. If two or more identical populations are gathered, the aggregate index does not change, i.e. the index is independent from the population size.

6. *Decomposability*. The aggregate index can be expressed as weighted mean of subgroup mobility indices (M_α^g, with $g = 1,2,...,G$), in which the weights correspond to the size of the groups:

$$M_\alpha = \sum_{g=1}^{G} \frac{M_\alpha^g \cdot N_g}{\sum_{g=1}^{G} N_g}$$

7. *Subgroup consistency*. If inter-temporal mobility increases within a given subgroup and other subgroups remain unchanged, then the aggregate index must increase.

4. Special case: an index of unemployment persistence

The inter-temporal mobility index $m_\alpha(z_i)$ defined in (2) can be computed for any ordinal status; the particular focus of this paper is the occupational status. Suitable choices of the assumptions for the index $m_\alpha(z_i)$ may lead to an index of persistence in unemployment.

Consider X as a dummy variable for the unemployed status, that is $x_t^i = 1$ if individual i is unemployed (or has lost his job) at time t and $x_t^i = 0$ if individual i is employed at time t.

Also consider the comparison function $\delta_{it} = \max(x_t^i - x_{t-1}^i; 0)$. Therefore, comparison δ_{it} is an indicator variables equal to 1 only when the individual enters the status of unemployed at time t while s/he was employed at time t-1, otherwise it takes zero value.

One may want to allow for a scenario in which assuming that being unemployed for a number of consecutive periods has a worse effect than moving in and out of unemployment over time. A choice of the discount factor $w(t)$ that allows for such a scenario is the following:

$$w(t) = \frac{(D_t(z_i))^2}{p_i} \tag{6}$$

where $D_t(z_i)$ be the maximal number of consecutive periods including t in per-period unemployment status. See Bossert et al. (2012). The following example will help clarify the definition of the function $D_t(z_i)$.

Example 2. Let $T = 7$. Consider the individual i's profile $z_i = (0,1,1,0,0,1,0)$. The length of the first employment spell is one: $D_1(z_i) = 0$. The following is an unemployment spell of length two: $D_2(z_i) = D_3(z_i) = 2$. The next two are periods in employment: $D_4(z_i) = D_5(z_i) = 0$. Period 6 is a single period in unemployment: $D_6(z_i) = 1$. The final is a one-period out of unemployment spell: $D_7(z_i) = 0$.

Therefore, choosing as discount factor the function in (6) and as sensitivity parameter α=0, the inter-temporal mobility index $m_\alpha(z_i)$ becomes a measure of individual unemployment persistence, as follows

$$u(z_i) = \sum_{i=T-p_i+1}^{T} \frac{(D_t(z_i))^2 \cdot \delta_{it}}{(p_i)^2},$$

(7)

with δ_{it} equals 1 if individual enters unemployment status.

The index ranges between 0 (case of absence of unemployment in each spell) to 1 (unemployed status in each spell of the period under consideration).

The following example shows how the measure $u(z_i)$ works.

Example 3 Let us compare the two following individual status profiles: $z_1 = (0110)$ and $z_2 = (0101)$, where 0 means employed status and 1 means unemployed status. The first individual experiences unemployment for two consecutive periods of time, while the second individual moves in and out of unemployment. The former scenario is evaluated as worst than the second one; therefore, our measure will take higher value in the first than in the second case. In fact, $u(z_1) = 0.44$, while $u(z_2) = 0.22$.

In order to evaluate the overall persistence in unemployment in a given society the aggregate index proposed is the following:

$$U = \frac{1}{n} \sum_{i=1}^{n} u(z_i),$$

(8)

where $u(z_i)$ is the individual index of persistence in unemployment defined in (7).

5. Empirical application

The class of indices of inter-temporal mobility proposed in (5) and of persistence in unemployment defined in (8) are now applied to the context of occupational mobility in Italy.

The empirical illustration is based on a sample of the Compulsory Communications ("Comunicazioni Obbligatorie") data provided by Italian Ministry of Labour and Social Policies.

The Compulsory Communications (henceforth, CC) data includes all activations, transformations, fixed-term extensions, early anticipated terminations of a working relationship, either public or private.

The sample refers to all Italian workers born on 15 January, 15 April, 15 July and 15 October of any year. Our database therefore includes about 1 out of 91 of all workers who have been involved in the CC system over the period between January 2009 and June 2012.

The population of interest are the 18-35 aged workers who activated a contract in 2009. Individuals who entered the CC database for the first time after December 31, 2009 are excluded from the analysis.

The CC data have as unit of observation the contract ("contratto di lavoro"), defined as a working relationship between an employer and an employee and characterized by a starting date. However, in the context of mobility analysis, the key concept is the worker rather than the contract; therefore, the worker's history needs to be reconstructed starting from the original CC data, so that the observation unit becomes the individual.

For more details on the data preparation and cleaning process I refer to Lilla and Staffolani (2011), while further information on the methodology for joining different contracts corresponding to same individual can be found in Picchio and Staffolani (2013).

CC data provides lots of information: one could follow the individual occupational status even daily. Here for simplicity a monthly unit of time is considered, and for each month he *prevalent* contract is selected (according to type and length of contract).

The variable of interest is the occupational status. Four are the types of occupational status considered, that are ordered as follows: (1) *not in employment*, (2) *temporary contract* (including fixed-term contract- "contratto a tempo determinato", parasubordinate contract - "contratto di collaborazione coordinata e continuativa", internship contract - "contratto di stage", interim contract - "lavoro interinale"), (3) *apprenticeship contract* ("contratto di apprendistato"), (4) *permanent contract*, that is the open-ended contract ("contratto a tempo indeterminato").

Note that the starting time of the contract's activation is not the same for each individual in the database; therefore the length of follow-up is specific for each individual.

The new inter-temporal mobility measures have been computed choosing the sensitivity parameter $\alpha = 0$ (headcount ratios).

Table 1 shows that for the population of young workers (18-35 years old) who activated a contract in Italy in the year 2009, the headcount ratio of inter-temporal

overall mobility is equal to 7%, while the upward mobility is significantly higher than the downward mobility (4% versus 3.1%).

Table 1 – *Inter-temporal mobility headcount ratio, total and by subgroups (percentage values).*

	Overall mobility			Downward mobility			Upward mobility		
	Index	95% C.I.		Index	95% C.I.		Index	95% C.I.	
TOTAL	7.0	7.0	7.1	3.1	3.0	3.1	4.0	3.9	4.0
NATIONALITY									
Italian	7.3	7.2	7.4	3.2	3.2	3.3	4.1	4.0	4.1
EU	7.9	7.6	8.1	3.2	3.1	3.3	4.7	4.5	4.8
non-EU	5.6	5.4	5.7	2.4	2.3	2.4	3.2	3.1	3.3
GENDER									
Male	7.0	6.9	7.1	3.0	3.0	3.1	4.0	3.9	4.0
Female	7.0	6.9	7.2	3.1	3.0	3.1	4.0	3.9	4.0
EDUCATION									
None	6.4	6.2	6.5	2.6	2.6	2.7	3.7	3.6	3.8
Primary	7.3	6.6	7.9	3.0	2.7	3.4	4.3	3.9	4.6
Lower secondary	7.9	7.7	8.0	3.4	3.3	3.5	4.5	4.4	4.5
Higher secondary	6.9	6.8	7.1	3.1	3.0	3.1	3.9	3.8	3.9
Tertiary	6.2	6.0	6.4	3.0	2.9	3.1	3.3	3.2	3.4
AGE									
18- 24 years	7.5	7.4	7.6	3.2	3.1	3.3	4.3	4.2	4.4
25-35 years	6.7	6.7	6.8	3.0	2.9	3.0	3.8	3.7	3.8
MACRO-AREAS									
North-East	7.3	7.1	7.4	3.3	3.2	3.3	4.0	3.9	4.1
North-West	6.0	5.9	6.1	2.7	2.6	2.7	3.4	3.3	3.4
Center	6.5	6.4	6.7	2.8	2.7	2.9	3.7	3.6	3.8
South and Island	8.0	7.9	8.2	3.4	3.3	3.5	4.6	4.6	4.7

Source: author's elaboration of CC data

Splitting the analysis by subgroups according to the nationality, one may note that the workers with a European (but not Italian) citizenship have higher inter-temporal mobility than the Italian workers, while the least mobile are the non-EU individuals.

Table 1 shows also that the difference between males and females in terms of mobility are not statistically significant, while education and age have a significant effect. In particular, having none or tertiary education implies significantly less mobility than having primary or secondary education. Moreover, the younger workers are significantly more mobile than the older ones (7.5% versus 6.7%).

Splitting the workers according to the geographical area of their first contract, one may note that mobility is significantly higher in the South (Islands included), followed by North-East, North-West and, in the last position, the Center of Italy.

Table 2 looks at the Italian regions and shows that the regions with higher mobility are Valle d'Aosta and Trentino Alto Adige (with the autonomous provinces of Bolzano and Trento), where the levels of upward mobility are among the highest of the country.

Table 2 – *Inter-temporal mobility headcount ratio by regions (percentage values).*

	Overall mobility			Downward mobility			Upward mobility		
	Index	95% C.I.		Index	95% C.I.		Index	95% C.I.	
Piemonte	6.3	6.0	6.5	2.8	2.6	2.9	3.5	3.4	3.7
Valle d'Aosta	9.5	7.8	11.1	4.1	3.3	4.9	5.4	4.5	6.3
Lombardia	5.7	5.5	5.8	2.5	2.4	2.6	3.1	3.1	3.2
Trento	9.9	9.2	10.7	4.5	4.1	4.9	5.5	5.1	5.9
Bolzano	9.2	8.5	9.9	4.0	3.7	4.4	5.2	4.8	5.6
Veneto	6.8	6.5	7.0	3.0	2.9	3.2	3.7	3.6	3.9
Friuli V. Giulia	6.7	6.2	7.2	3.1	2.9	3.4	3.6	3.3	3.9
Liguria	7.4	7.0	7.9	3.3	3.0	3.5	4.2	3.9	4.4
Emilia Romagna	7.0	6.8	7.2	3.1	3.0	3.3	3.8	3.7	4.0
Toscana	7.0	6.7	7.3	3.1	3.0	3.2	3.9	3.8	4.1
Umbria	6.3	5.7	6.8	2.7	2.5	3.0	3.5	3.2	3.8
Marche	7.0	6.6	7.5	3.1	2.9	3.3	3.9	3.7	4.2
Lazio	6.1	5.9	6.3	2.5	2.4	2.6	3.6	3.5	3.7
Abruzzo	7.8	7.3	8.3	3.4	3.2	3.6	4.4	4.1	4.7
Molise	9.0	7.8	10.3	4.0	3.4	4.7	5.0	4.4	5.6
Campania	7.0	6.7	7.2	2.9	2.7	3.0	4.1	4.0	4.2
Puglia	8.6	8.3	8.9	3.7	3.6	3.9	4.9	4.7	5.1
Basilicata	8.8	7.9	9.7	3.8	3.4	4.3	5.0	4.5	5.4
Calabria	9.2	8.8	9.6	3.8	3.6	4.0	5.3	5.1	5.5
Sicilia	7.8	7.5	8.1	3.2	3.1	3.4	4.6	4.4	4.7
Sardegna	8.4	8.0	8.8	3.6	3.4	3.9	4.7	4.5	5.0

Source: author's elaboration of CC data

Let us now move to analyze the persistence in unemployment, by computing the index proposed in formula (8). From Table 3 one may note that EU-citizens show significantly higher persistence in unemployment than Italian workers, while no significant difference emerges between males and females. Splitting the population by education level, the lower unemployment persistence is registered for the higher educated individuals (14%). Moving to the age-based groups, one may note that the risk of persistence in unemployment decreases significantly with the age. Finally, looking at the geographical macro-areas, the highest unemployment persistence is registered in the South of Italy and in the Islands, followed by Center of Italy, North East and North-West, respectively.

Table 4 reveals, moreover, that the Italian region with the highest rate of persistence in unemployment is Sardegna, while the region with the smallest rate is Lombardia.

Table 3 – *Unemployment persistence (percentage values).*

	Index	95% Confidence Interval	
TOTAL	19.9	19.6	20.2
NATIONALITY			
Italian	19.7	19.4	20.1
EU	30.4	29.2	31.6
non-EU	15.4	14.7	16
GENDER			
Male	20.1	19.6	20.5
Female	19.7	19.2	20.1
EDUCATION			
None	19.8	19.1	20.4
Primary	22.7	19.7	25.7
Lower secondary	22.0	21.5	22.6
Higher secondary	19.6	19	20.1
Tertiary	14.0	13.2	14.9
AGE			
18-24 years	23.0	22.5	23.6
25-30 years	18.5	18	19.1
31-35 years	17.5	16.9	18.0
MACRO-AREAS			
North-East	18.5	17.9	19.2
North-West	16.9	16.3	17.5
Center	19.6	19.0	20.3
South e Islands	23.4	22.8	24.0

Source: author's elaboration of CC data

Table 4 – *Unemployment persistence by regions (percentage values).*

Regions	Index	95% Confidence Interval		Regions	Index	95% Confidence Interval	
Piemonte	18	16.7	19.2	Marche	21	19	23.1
Valle d'Aosta	18.9	13.2	24.6	Lazio	20.4	19.4	21.4
Lombardia	15.9	15.2	16.6	Abruzzo	22	20	24.1
Trento	22	19.4	24.7	Molise	19.7	15.4	24
Bolzano	24.6	21.7	27.4	Campania	23.6	22.4	24.9
Veneto	17.8	16.8	18.9	Puglia	22.9	21.6	24.2
Friuli Venezia G.	17.2	15.1	19.4	Basilicata	24.4	20.9	28
Liguria	21.1	19.1	23.1	Calabria	22.9	21.2	24.5
Emilia Romagna	17.7	16.7	18.7	Sicilia	23.6	22.4	24.8
Toscana	18.6	17.4	19.8	Sardegna	25.4	23.5	27.3
Umbria	16.6	14.3	18.8				

Source: author's elaboration of CC data

6. Concluding remarks

This paper has provided a new class of mobility indices that takes into account the inter-temporal status movements over more than two periods of time, differently from the traditional measures. The index has been obtained in two steps. First, an individual inter-temporal mobility index has been provided, which allows for sensitivity to mobility (through parameter α) and time discount, as well as a decomposition into upward and downward mobility. Since memory plays an important role when individual makes comparisons with his past, a discount factor has been introduced. In fact, an individual is usually less affected by his remote past than by his recent past. Secondly, individual mobility indicators are aggregated over all the population, in order to obtain an index which allows for comparisons among different societies.

The empirical exercise has analysed the inter-temporal mobility of occupational status in the Italian labour market and has exploited the potentiality of the Italian Compulsory Communications data, which stays in the availability of reconstructing even daily worker's history.

Future research may explore several directions. On the theoretical part, a possible extension may consider an axiomatic characterization of the class of indices proposed. On the empirical part, the application may be enriched by including sensitivity analysis on the parameter α and on the time unit definition, as well as regression models for detecting the main determinants of the inter-temporal mobility.

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SUMMARY

Aim of the paper is to provide a new class of mobility indices that takes into account the inter-temporal status movements over more than two periods of time. The index is obtained in two steps. First, an individual inter-temporal individual mobility index is provided, which allows also for analysis of upward and downward mobility. Since memory plays an important role when individual makes comparisons with his past, a discount factor has been introduced. Secondly, individual mobility indicators are aggregated over all the population, in order to obtain an index which allows for comparisons among different societies. The empirical application analyzes the mobility of the occupational status in the Italian labour market within an inter-temporal framework, using the Italian Compulsory Communications system data.

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