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**IMPROVING THE MEASUREMENT OF GOVERNMENT  
OUTPUT IN ITALY**

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*(preliminary draft)*

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## Table of contents (\*)

1. The general framework of Government output.....	3
1.1 Introduction and main findings .....	3
1.2 Main revisions for Government output estimation at current prices .....	3
1.3 Deflation methods .....	5
2. Deflation of the Government Output.....	7
2.1 Input methods .....	7
2.1.1 The Average Wages Method for Compensation of employees .....	7
2.1.2 Other components of the output costs .....	13
2.2 Output methods .....	14
2.2.1 Health .....	14
2.2.1.1 The quality of hospital service.....	17
2.2.2 Education .....	19
2.2.2.1 School system .....	20
2.2.2.2 University education.....	22
2.2.2.3 Vocational training .....	28
2.2.2.4 Subsidiary services to education .....	28
2.3 Other individual services .....	31
2.4 Comparisons between input methods (AW) and output methods .....	32
2.4.1 Education .....	32
2.4.2 Health .....	34
ANNEX 1 .....	36
ANNEX 2 .....	45
ANNEX 3 .....	46

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# 1. The general framework of Government output

## 1.1 Introduction and main findings

The general revision of the National Accounts made it possible to examine the deflation methods of the economic aggregates relatively to the non-market component, by trying to use, where the data sources presented enough details, methodologies that provided for output indicators, especially as regards the economic activities for which the non-market production is more important than the market one and that are related to the provision of individual services, such as health, education and recreational services.

The input methods are mainly used for the economic activities that offer collective type of services, for which it is not so straightforward to obtain measurements of volume that represent the phenomenon. As regards the individual kind of services, it is possible to obtain measurements of volume that allow directly to calculate the production in volume terms.

The measurement of government output is included in the theoretical framework of the national accounts evaluation in volume terms. Since the very beginning of ESA95 introduction the Italian National accounts adopted, for the non market sector, measures based on output methods . This had been possible for the two most relevant areas of individual services, education and health.

Further advancements introduced with the revision of output indicators used up to the benchmark revision - due to the availability of new and reliable data sources, and the adoption of the chain-linking system for the evaluation, jointly with the studies for the introduction of additional measures to the existing ones and with the effort done concerning the deepening of quality issues- should be regarded as improvements of the whole process. The difficulties connected with the management of institutional changes that regulate the provision of services, such as the case of university Education, and the sensitivity of the innovations to be introduced in the National Account framework stress that:

- Only feasible innovations are to be introduced, in order to give stability and reliability to the National Accounts estimations;
- The underling data flows have to be monitored over time, in order to provide for the sustainability of the methodologies and, when necessary, to arrange for possible changes;
- The preference should be given to the implementation of a comprehensive and full picture of government production.

As a result of the revision, up to now, more than 45% of the total government output is directly calculated in volume terms and, also for this part, a simultaneous calculation has been performed by using input methods as described further on.

The efforts done for the implementation of the Eurostat recommendation *-Handbook on price and volume measures in National Accounts (2001)-* and the results achieved so far shouldn't allow to forget that on, this complex and very sensitive issue, more guidance and continuous exchange of views and findings should be desirable to ensure reliability of the methodologies and significant international comparisons.

## 1.2 Main revisions for Government output estimation at current prices

The relevance of the Government output in the framework of the total production results directly by comparing the value of GG output with respect to the total production of the economy. The general revision of the Italian national accounts has required a new framework for the calculation of the production of Government, determining the new structure implemented according to the supply and use scheme. As a consequence the complex scheme that allows to pass from the basic data sources, derived from the public accounting, to the NA definition, has been implemented with a more detailed analysis. From such a framework based on an institutional approach we passed to a representation of production according to the

branches of economic activities. This passage, more analytical than in the past, facilitates also the functional analysis of public expenditure.

General Government sector is defined according to ESA95 as the sector that includes all institutional units which are other non-market producers, whose output is intended for individual and collective consumption (ESA95 par. 2.68); in fact government output is by far non-market and is concentrated in the production of services of public administration, education, health and other social services (NACE classes L, M, N), Research and development, recreational and cultural activities and some minor services. The evaluation of non-market output is by definition calculated as the sum of the total production costs (ESA95 par. 3.53), i.e. the sum of: compensation of employees, intermediate consumptions, consumption of fixed capital, other taxes on production.

The basic data used for the calculation of Government output derive from the elaboration on the public accounts statement that are analysed according to the economic and functional criteria. The functional classification used is the COFOG<sup>1</sup>. The passage from the functional classification of production expenditure to the classification according to the industries-products is performed by using the bridge-matrices COFOG-CPA that allow to pass from the functional classification to a scheme of homogeneous production.

The innovations introduced in the National Account revision for the public component, concerned:

1. The examination and the reclassification, where necessary, in an exhaustive way of the distribution of public employment derived from the 8<sup>th</sup> Census of the Institutions by NACE classification. The overall result has been to have a wider concentrations of public employment on NACE L. This reclassification regarded the non-traditional activities of Government and didn't involved the traditional activities such as Education and Health.
2. The construction, for each institution or group of institutions concerned, of the bridge-matrices between functions (third level of COFOG classification) and the CPA (fifth digit) for the different kind of public institutions<sup>2</sup>.
3. The better specification of the research and development activities performed by Government units, particularly for the Universities based on the results<sup>3</sup> of the Scientific Research survey.
4. The determination, for the institutional units belonging to the Government sector as it happens for the market units, of secondary productions that, in the supply matrix, are represented as figures outside of the diagonal. The detailed analysis of production of the different kind of public units made it possible to separate some goods and services that are to be considered as secondary production. As it can be seen from the matrix presented, the supply matrix of Government is basically diagonal. It can be noted that small amounts of production have been transferred; in the simplified matrix<sup>4</sup> the software production for own final use of Government units has been re-allocated to its proper row, that is to say in the NACE A-K. On the other hand reading the matrix by column it can be seen that units mainly devoted to the production of Education services (NACE M) have also secondary output connected to the provision of auxiliary services such as the provision of meals in the University canteens, the activities connected to the social services to students, the cultural and recreational activities and the already mentioned production of software.

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<sup>1</sup> COFOG is one of the functional classification defined by the SNA and referred to the Government expenditure by function

<sup>2</sup> The 14 groups of institutions considered are as follow: State, Institutions providing cultural services and assistance at the central level, Research bodies, Economic services producers, Regions and autonomous provinces, Provinces, Municipalities, Mountains development bodies, Chambers of commerce, Other local producers of economic services, Institutions providing education, cultural services and assistance at the local level, Local health units and Hospitals, Social security funds.

<sup>3</sup> This calculation is based on the working time of the university employees split between research activities and didactic activities.

<sup>4</sup> The actual calculation of the NA aggregates is currently performed according an internal structure of 101 industries.

**Supply matrix of non market output for General government – percentage distribution at current prices – Year 2000**

	A-K	L	M	N	O	Tot
A-K	4,67	0,22	0,02	0,08	0	4,99
L	0,01	44,66	0	0	0	44,67
M	0	0	25,23	0	0	25,23
N	0	0	0,01	22,71	0	22,72
O	0	0,06	0,02	0	2,31	2,39
Tot	4,68	44,94	25,28	22,79	2,31	100,00

The importance of the non market activities for the NACE classes can be viewed by reading the following matrix that gives the weight of the Government non market component with respect to the total production of the economy.

**Supply matrix – Year 2000 – Ratio between Government non market output and production of the Total economy**

	A-K	L	M	N	O	Tot
A-K	0,46	100,00	8,58	39,31	0,26	0,49
L	100,00	99,90	-	-	100,00	99,90
M	0,38	100,00	80,59	100,00	100,00	80,42
N	0,32	-	100,00	53,74	-	52,97
O	-	100,00	100,00	-	6,63	6,75
Tot	0,46	99,9	80,14	53,68	6,37	8,58

### 1.3 Deflation methods

The deflation procedure hereafter described regards the institutional units that carry out non-market activities, that is to say, the units whose production is offered free of charge or at not economically significant<sup>5</sup> prices to other units. The non-market production includes two different types of output:

- Individual good and services: consumed by individual (such as the education services or the health services);
- Collective services: provided simultaneously to the society as a whole (such as public order and safety services or general administration services).

In case there is no market price for evaluating the production the value of the non-market output is conventionally calculated as sum of the costs.

The absence of a market price, that exists for the market output and is used for the deflation , requires the use of specific methodologies for the evaluation in volume terms. The procedures for the deflation are as follow:

- INPUT methods: by means of these, the value of the "output at constant prices is estimated based on the deflation of each cost component that, in the case of non-market services, contributes in forming its value (Compensation of employees, Intermediate Consumptions, Consumption of fixed capital, Other taxes on production)"<sup>6</sup>.

<sup>5</sup> The goods and services produced are sold at economically significant prices only when the sales cover more than 50% of the production costs.

<sup>6</sup> Inventory on the sources and calculation methods for evaluation at constant prices, Istat 2004.

Component	Deflators/Methods	Main data Sources
Compensation of employees (D1) Other taxes on production (D29)	Average wages Method	<ul style="list-style-type: none"> <li>The Annual Count Survey (CA) – RGS</li> <li>Censimento dell'industria e dei servizi 2001</li> <li>Statistiche giudiziarie civili – Istat</li> <li>Statistiche giudiziarie penali – Istat</li> <li>Banca dati Ministero della Salute</li> <li>Elaborations of DCCN on data provided by other data sources</li> </ul>
Consumption of fixed capital (K1)	Specific deflators	<ul style="list-style-type: none"> <li>Elaborations of DCCN on data provided by other data sources</li> </ul>
Intermediate Consumption (P2)	Input price index	<ul style="list-style-type: none"> <li>CPI – Istat</li> <li>Elaborations of DCCN on data provided by other data sources</li> </ul>
SIFIM	Method established by Regulation UE 1889/2002	<ul style="list-style-type: none"> <li>Elaborations of Banca d'Italia</li> <li>Elaborations of Cassa Depositi e Prestiti</li> <li>Elaborations of DCCN on data provided by other data sources</li> </ul>
VA	Double deflation	The Value Added is calculated as difference between Output and Intermediate consumption in volume.

- OUTPUT methods: which provide for the "identification of a volume component, by means of indices of the quantities produced of the service examined"<sup>7</sup>.

Sector	Main data Sources	Note
Education	<ul style="list-style-type: none"> <li>La scuola statale: sintesi dei dati (anni scolastici 2001-2005), MIUR</li> <li>Iscritti e immatricolati per anno accademico, MIUR;</li> <li>Laureati e diplomati per anno solare, MIUR</li> <li>Banca dati sui corsi di studio, Ufficio di Statistica del MIUR;</li> <li>Banca dati dei docenti di ruolo, MIUR</li> <li>Rilevazione dei bilanci consuntivi degli enti universitari, Istat;</li> <li>Statistiche della formazione professionale: le strutture, le attività e la spesa, ISFOL</li> <li>Rilevazione sul diritto allo studio universitario, MIUR</li> </ul>	The indices for scholastic and university education incorporate the changes quality
Health	<ul style="list-style-type: none"> <li>"Dimessi dagli istituti di cura pubblici e privati", Ministry of Health</li> <li>Sets of fees</li> <li>"Indagine rapida sui dimessi dagli istituti di cura", Istat</li> </ul>	The correction for changes quality is based on an indicator that takes into account the high technology diagnostic equipment

- Price indices.

The main innovations regarding the deflation process are:

- The passage from a fixed-base system, with 1995 as base year, to a system that evaluate the aggregates at prices of the previous year;
- Construction of annual supply matrices at prices of the previous year, distinguished per General Government and Non-profit Institutions serving households;
- Deflation of the all industries of non-market production, even where the weight is not very relevant with respect to the total production<sup>8</sup>.

In particular, the change from a fixed-base system to a chain index system has led, on the one hand, to revise the calculation methodologies of the aggregates in terms of volume and, on the other hand, to extend and complete the informative basis necessary for the transition to the new system. It ought to be mentioned the fact that the deflation system of the non-market sector has drawn considerable benefits from the refinement and consolidation of some of the data sources available, especially as regards the sector of General Government. In the case of the Non-profit Institutions serving households, the lack of informative sources available has made it extremely difficult, at least for the time being, to use methods different than the input ones; the production was thus obtained by adding the production costs individually deflated.

<sup>7</sup> Ibidem

<sup>8</sup> Before the general revision the non market product was separately deflated for the main eleven non-market industries; for the rest of the production the same indicators of the non market output were used.

**Table 1. Distribution of government output at current prices - 2001**

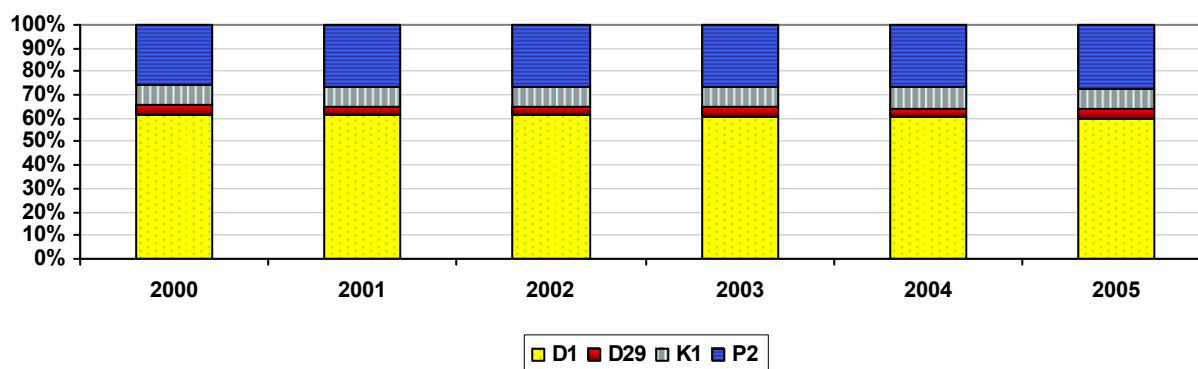
NACE	Description	Percentage incidence
A-K	All NACE Class from A to K	5.00
L	Public administration and defence; compulsory social security	44.67
M	Education	24.99
N	Health and social work	22.91
O	Other community, social and personal service activities	2.43
<b>Total</b>		<b>100.00</b>

## 2. Deflation of the Government Output

### 2.1 Input methods

As regards the General Government sector, the most important part of the output costs is the compensations of employees (D1), which make up more than 60% of the overall production value at current price (fig. 1). For the deflation of such component, the Average Wages Method was used<sup>9</sup>, which, despite of being heavy to implement at the beginning – as it requires a wide database to be available -, allows to evaluate in a complete manner this cost component that represents the most important part of the General Government Value Added. The use of this AW Method provides the base for the future implementation of the study of labour productivity.

**Figure 1. Percentage incidence of the items making up the Total non-market output of the General Government. Elaborations on data at current prices, 2001**



The deflation of the other components of output cost, that is to say other taxes on production, intermediate consumptions<sup>10</sup> and consumptions of fixed capital, do not presents any relevant difficulties.

#### 2.1.1 The Average Wages Method for Compensation of employees

The compensations of employees are defined as the total remuneration, in cash or in kind, payable by an employer to an employee in return for work done by the latter during the accounting period (ESA95. par. 4.02). Compensation of employees is made up of two components: wages and salaries (in cash and in kind) and employers' social contributions (actual and imputed).

<sup>9</sup> The description of this method can be found on the Final report of the Eurostat task force on NACE L.

<sup>10</sup> According to the Council regulations n. 1889/2002 FISIM have been included in the Government intermediate consumption. Regarding this issue a specific deflation method has been developed.

To deflate such item, it is possible to use the estimation of the labour input by using the AW method, which uses the average wages and salaries per categories of employees not having the total of hours worked<sup>11</sup>.

The calculation of the average wages and salaries is carried out on the categories of workers identified during the stratification of the elementary information. Such approach implies that the breakdown in prices and volume is implicit in each category, where the changes among the categories are included in the volume component, while the wage increases in the categories are reflected in the price component.

The elementary information is aggregated using the Laspeyres index, coherently with the Eurostat recommendations for the volume measures of the national accounts aggregates<sup>12</sup>.

$$IL_i^{t/t-1} = \frac{\sum_{jk} w_{jk}^{t-1} l_{jk}^t}{\sum_{jk} w_{jk}^{t-1} l_{jk}^{t-1}}$$

- $t_{-1}$  = previous year;  $t$  = current year
- $l_{j,k}$  = volume component: number of employees
- $w_{j,k}$  = price component: per capita wages and salaries

In order to apply the AW method, figures regarding the number of the General Government employees and the relative expenditures held in the Annual Count Survey (CA), adequately integrated with other sources, had been used. The Annual Count Survey, produced yearly by the State accounting department, provides a periodical and updated basis on public employment trends and related labour costs.

The implementation of the AW method has required a standardization of the elementary data to make them homogenous in order to aggregate them in categories that can be separately deflated.

In particular, it was necessary to reconstruct at the right level of coherence and reliability, the data regarding:

- The volume component, made up of the information relative to the number of the employees engaged in General Government;
- The price component, made up of the information on the workers expenditure data.

The Annual Count Survey, having as reference the work contract applied to the employees and the sector law for non-contract workers, is made up of three macro levels of data aggregation:

1. Contract sector;
2. Types of institutions and institutions making up the contract sector;
3. Economic qualifications/positions present for each type of institution.

The main issues are linked to the use of these data could be synthesised as follows:

- Partial coverage of the general government sector;
- Partial completeness of basic information provided by each survey unit;
- Missing of homogeneity of treatment between the classification of institutions by sector of contract and their economic sector classification.

In this context, the first work of revision at a micro level of the database regarded:

- A coherence analysis of the database, that is to say the precise examination of the information given. In particular, a verification was made in order to avoid a lack of information on the volume component or in the price component;
- An inter-time coherence analysis, which has led to study the information in time series for the period considered;

<sup>11</sup> For the time being the statistics on hours worked can be considered as a work in progress still not to be used; the future utilisation of these data sources will be considered also with regard to the final results of an interinstitutional working group specifically set up on this topic.

<sup>12</sup> "The volume measures available at an elementary level of aggregation are to be aggregated using the Laspeyres index [...]. The price measures available at an elementary level of aggregation should be aggregated using the Paasche level [...]", quotation from "Handbook on price and volume measures in national accounts", Eurostat, 2001.



- A comparison analysis among the institutional units involved in the survey to verify the coherence and completeness of the database.

After having completed the first phases of database verification, the institutional units were reclassified according to the criteria adopted in the National Accounts for the construction of the General Government accounts.

The revision of the database was thus directed to the transition of the institutions from the classification per contract sector to that at the third level of classification of the institutional sectors<sup>13</sup>, coherently with the indications held in list S.13 of the General Government<sup>14</sup>. This work has led to exclude the institutions that, despite being present in the database, did not correspond to the ESA95 classification criteria for the General Government.

Contextually, based on the joint examination of the list of institutions held in the CA source and the list S.13 of Government units, it was possible to verify which institutions required some integration to be made. These integrations were done, using regression methods or by means of the donor method. It was thus possible to reconstruct a detailed database necessary for defining the elaboration matrices.

The reconstruction of the institutional sub-sectors as provided in the National Accounts was followed by the treatment of the data for:

- The occupational profiles, relatively to the employees with a fixed-term contract, employees with an open-ended contract and employees with a part-time contract;
- Wage and salary profiles, with reference to the wage elements and additional items.

The first phase has led to the homogenisation of the contract profiles as defined in the CA for a uniform and comparable treatment of the available information. In particular, 10 macro-profiles have been considered: managers, levels, contractors, workers with a fixed-term contract, workers with a work-training contract, judges, skilled employees, socially useful workers<sup>15</sup>, temporary workers, part-time workers.

A separate elaboration was carried out as regards the personnel with a part-time contract, so as to take into account the days actually worked by employees in the administrations.

The wage and salary items required examining the costs items as surveyed by the CA survey. This work has led to exclude some items, such as the IRAP (Regional Tax on Productive Activities), which were not included in the definition of compensation of employees as laid down in the ESA95, being considered as other taxes on production.

The elaboration and reclassification of the elementary data allowed reconstructing, for each year of elaboration, the two groups of rectangular matrices for employment and wages and salaries (35\*10) where the rows indicate the institutions (broken down into 35 sub-sectors<sup>16</sup>) and the General Government economic sectors (broken down into 14) while the columns show the data for the contract macro-profiles considered.

These matrices, according to the structure indicated in the previous scheme, were done at the highest level of details, that is to say:

1. Matrices per occupational profile, distinguished per personnel with a fixed-term contract, with an open-ended contract and employees with a part-time work contract;
2. Matrices per wage and salary profile, distinguished into wage items, additional items, and labour cost items;
3. Matrix of the per capita drawn per contract profile and institution of reference, obtained as elaboration of the matrices per occupational and wage and salary profile.

<sup>13</sup> This classification at the third level is used for internal elaborations.

<sup>14</sup> This reclassification work has led, for example, to move the animal health care institutes from the Health sector, in which they had been classified coherently with the contract profile, to the Research Institutes sector, to which they belong according to the list S13 of the General Government units.

<sup>15</sup> The socially useful workers and the temporary workers have been excluded from the elaborations why they are not included in the ESA95 definition of Compensation of employees.

<sup>16</sup> The classification of the institutions into 35 sub-sectors of reference is based on the necessity of adjusting to the calculation structure applied in the National Accounts for calculating the Full-time Equivalent Employment. The following aggregation into 14 sub-sectors is necessary to make the data of the annual count survey comparable with the aggregates at current prices elaborated in the operative units of the General Government.

35 institutions or groups of institutions	14 institutions or groups of institutions	Managers	Levels	Contractors	Fixed term workers	Skilled employees	Work-training workers	LSU	Judges	Temporary personnel	Part Time workers	Total
MINISTERI	State	a1,1	a1,2	...	...	...	...	...	...	...	a1,10	$\Sigma a1$
COSTITUZ	State	a2,1	a2,2	...	...	...	...	...	...	...	a2,10	$\Sigma a2$
SCUOLA	State	...	...	...	...	...	...	...	...	...	...	...
SICNAZ	State	...	...	...	...	...	...	...	...	...	...	...
DIFNAZ	State	...	...	...	...	...	...	...	...	...	...	...
LEVA	State	...	...	...	...	...	...	...	...	...	...	...
EEN	EEN	...	...	...	...	...	...	...	...	...	...	...
ALTRI ENA	ENA	...	...	...	...	...	...	...	...	...	...	...
ENA	ENA	...	...	...	...	...	...	...	...	...	...	...
EDR	EDR	...	...	...	...	...	...	...	...	...	...	...
SPERIM EDR	EDR	...	...	...	...	...	...	...	...	...	...	...
ZOOPROF EDR	EDR	...	...	...	...	...	...	...	...	...	...	...
OSSERV EDR	EDR	...	...	...	...	...	...	...	...	...	...	...
REGIONI	REGIONS	...	...	...	...	...	...	...	...	...	...	...
PROVINCE	PROVINCES	...	...	...	...	...	...	...	...	...	...	...
COMUNI	MUNICIPALITIES	...	...	...	...	...	...	...	...	...	...	...
ASL	ASL	...	...	...	...	...	...	...	...	...	...	...
AZOSP	ASL	...	...	...	...	...	...	...	...	...	...	...
IRCCS	IRCCS	...	...	...	...	...	...	...	...	...	...	...
CAMCOM EEL	CAMCOM	...	...	...	...	...	...	...	...	...	...	...
APT EEL	ALTRI EEL	...	...	...	...	...	...	...	...	...	...	...
AUTPORT EEL	ALTRI EEL	...	...	...	...	...	...	...	...	...	...	...
COMONT EEL	COMONT	...	...	...	...	...	...	...	...	...	...	...
UNCOM EEL	ALTRI EEL	...	...	...	...	...	...	...	...	...	...	...
EDS EEL	ALTRI EEL	...	...	...	...	...	...	...	...	...	...	...
AGLAV EEL	ALTRI EEL	...	...	...	...	...	...	...	...	...	...	...
AGSAN EEL	ALTRI EEL	...	...	...	...	...	...	...	...	...	...	...
ALTRI EEL	ALTRI EEL	...	...	...	...	...	...	...	...	...	...	...
UNIV EAL	EAL	...	...	...	...	...	...	...	...	...	...	...
LIRIC EAL	EAL	...	...	...	...	...	...	...	...	...	...	...
PARC EAL	EAL	...	...	...	...	...	...	...	...	...	...	...
ADISU EAL	EAL	...	...	...	...	...	...	...	...	...	...	...
ARPA EAL	EAL	...	...	...	...	...	...	...	...	...	...	...
AIRRSAE EAL	EAL	...	...	...	...	...	...	...	...	...	...	...
EDP	EDP	a35,1	a35,2	...	...	...	...	...	...	...	a35,10	$\Sigma a_{jk}$

These matrices have allowed, in this phase, establishing the levels of per capita wages and salaries ( $W_{jk}$ ) and of employment ( $L_{jk}$ ) at a macro-level, that is, without distinction by industry. In fact the data included in the CA-RGS are classified by institutional unit, but do not present information on the type of activity carried out. In order to be able to classify the employees by industry, it is necessary to integrate the information of the CA survey with other data sources. In this regard, two weight matrices have been set: the first one (weight matrix  $u_i$ ), which regards the employees, uses the information present in the eight General Census on Industries and Services (CIS)<sup>17</sup>; the second one (weight matrix  $f_i$ ), which regards the wages and salaries, was defined based on the structure per industry of the compensations of employees of the General Government institutional units, according to the elaborations to the classification of the Government output at current prices.

<sup>17</sup> The 8<sup>th</sup> Census of Industry and Services has allowed constructing the structure per industry of the employees of the General Government following the detailed classification per industry of the survey units.

Sectors	Institutions	1	...	3	...	94	...	99	...	Total
AL	ASL	-	...	-	...	0.7780	...	-	...	1.0000
AL	ALTRI EEL	-	...	-	...	-	...	-	...	1.0000
AL	CAMCOM EEL	-	...	-	...	-	...	-	...	1.0000
AL	COMONT EEL	-	...	-	...	-	...	-	...	1.0000
AL	COMUNI	0.0121	...	-	...	-	...	0.0413	...	1.0000
AL	EAL	-	...	-	...	-	...	0.0508	...	1.0000
EDP	EDP	-	...	-	...	-	...	-	...	1.0000
AC	EDR	-	...	-	...	-	...	-	...	1.0000
AC	EEN	-	...	-	...	-	...	-	...	1.0000
AC	ENA	-	...	-	...	-	...	0.3844	...	1.0000
AL	IRCCS	-	...	-	...	1.0000	...	-	...	1.0000
AL	PROVINCE	-	...	-	...	-	...	0.0182	...	1.0000
AL	Regioni	-	...	0.0019	...	-	...	0.0373	...	1.0000
AC	Stato	-	...	-	...	0.0020	...	0.0059	...	1.0000

Thanks to these weight matrices, it was possible to calculate the levels of wages and salaries of employment per industry as follows

$$\sum_{jk} W_{jk}^t * u_i^t = w_{jk}^t \qquad \sum_{jk} L_{jk}^t * u_i^t = l_{jk}^t$$

- t=current year
- $W_{jk}$ = levels of per capita wages and salaries at an aggregated level (not distinguished per industry);
- $L_{jk}$ = levels of employment at an aggregated level (not distinguished per industry);
- $u_i$  = weight of the per capita wages and salaries of employees of institution j according to the contract profile k per industry i;
- $f_i$  = weight of workers of institution j according to the contract profile k distinguished per industry i;
- $w_{jk}$ = levels of per capita wages and salaries per industry;
- $l_{jk}$ = levels of occupation per industry;

The matrices broken down to consider the cost and employment items distinguished per industry, have allowed to obtain an overall index of volume where the changes among the categories reflect the volume component (the representation of the volume components increases when the level of detail considered for forming the elementary categories increases too) and in which the wage increases are included in the price component.

$$IL_i^{t/t-1} = \frac{\sum_{j=1}^{35} \sum_{k=1}^{10} w_{jk}^{t-1} l_{jk}^t}{\sum_{j=1}^{35} \sum_{k=1}^{10} w_{jk}^{t-1} l_{jk}^{t-1}}$$

In the price component, the additional components of wages and salaries are determinant, as they represent the most variable share of the compensation of employees.

The stratification matrices allows not only to calculate the overall indices of industries for the General Government, but also to examine the indices per industry for the 35 sub-sectors of reference. The matrix of the volume indices constructed for the years of elaboration, according to the rows, shows volume indices by industry for each sub-sector of reference (total column) and, according to the columns, shows the volume indices per industry, institution and total General Government. Such detail allows for a complete examination of each sub-sector in the construction of the industry indices and allows, at a higher level of detail, to verify the coherence of the data in the database, at each elaboration step. Furthermore, the important work of stratification carried out on the data has made it possible to improve the reliability of

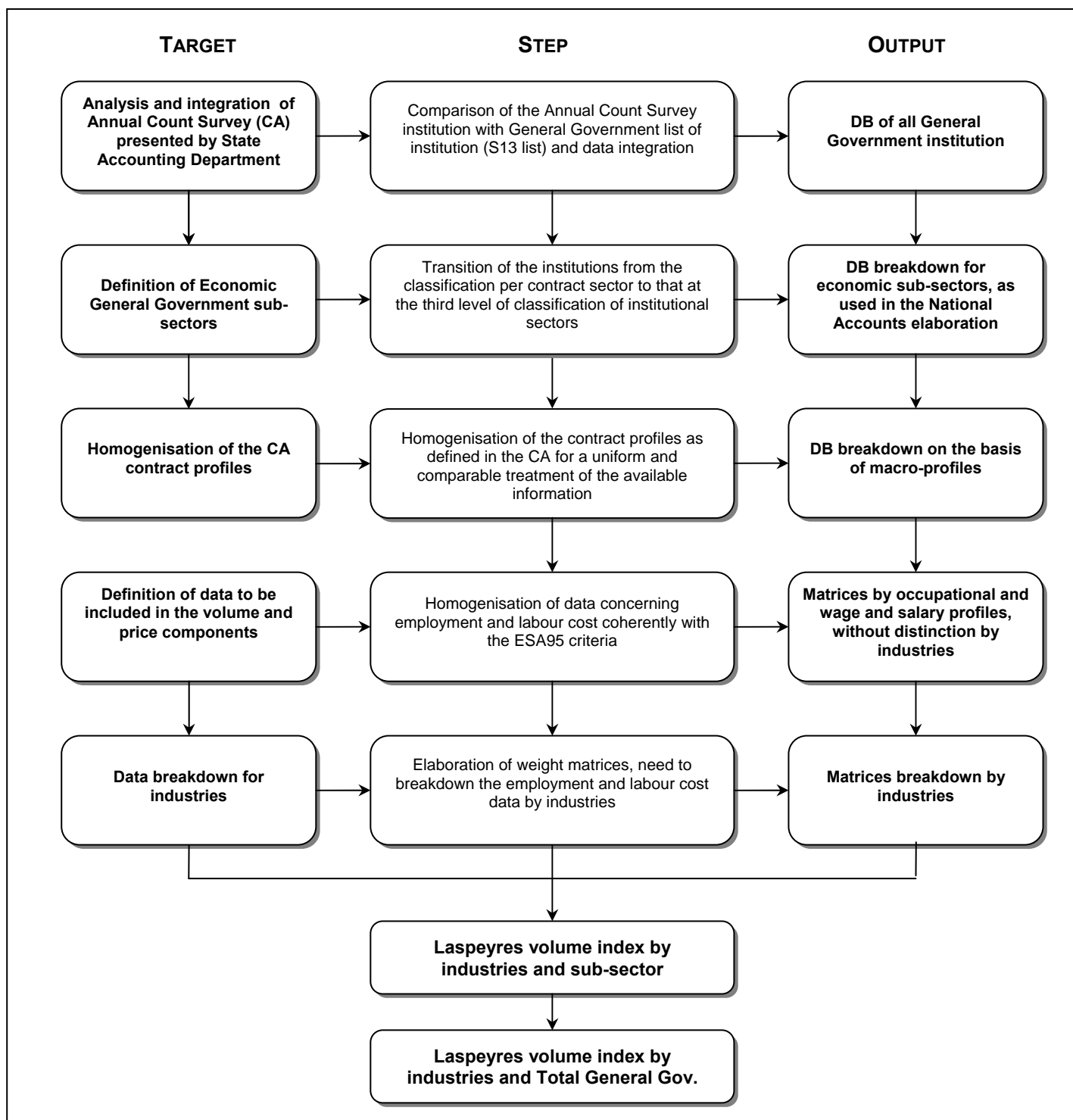
the estimates produced, allowing, at the same time, to improve the process of statistical integration of the missing data, when revising and completing the database.

As can be seen in the example indicated in the table, the territorial institutions, the local welfare institutions, the national welfare institutions and the State all contribute in forming the overall General Government index for industry 99, equal to 100.69

**Table 1. Volume indices matrix by industries and sub-sectors (aggregated in 14 groups). Example referred to year 2001**

Sectors	Sectors aggregated in 14 groups	1	...	3	...	63	...	94	...	99	Total
AL	ASL	-	...	-	...	-	...	100.27	...	-	100.37
AL	ALTRI EEL	-	...	-	...	-	...	-	...	-	105.40
AL	CAMCOM EEL	-	...	-	...	-	...	-	...	-	106.90
AL	COMONT EEL	-	...	-	...	-	...	-	...	-	106.50
AL	COMUNI	100.29	...	-	...	100.10	...	-	...	100.39	99.37
AL	EAL	-	...	-	...	-	...	-	...	101.51	103.80
EDP	EDP	-	...	-	...	-	...	-	...	-	100.49
AC	EDR	-	...	-	...	-	...	-	...	-	99.04
AC	EEN	-	...	-	...	-	...	-	...	-	99.65
AC	ENA	-	...	-	...	-	...	-	...	100.79	99.30
AL	IRCCS	-	...	-	...	-	...	107.45	...	-	107.45
AL	PROVINCE	-	...	-	...	-	...	-	...	101.73	107.96
AL	Regioni	-	...	102.33	...	-	...	-	...	100.34	101.18
AC	Stato	-	...	-	...	-	...	100.82	...	100.40	99.90
PA		100.29	...	102.33	...	100.10	...	100.54	...	100.69	100.43

In the case of NACE L, it was in part possible to integrate the use of the input methods with the output methods for the justice and legal activities services, thanks to the availability, for this sector, of reliable statistics on the quantities produced (legal proceedings and conflicts number). The presence of a mixed method for NACE L would not allow an overall evaluation of the labour input trend for this industry because of the part with the output method that, directly deflating the output, does not provide information on the contributions each cost items gives to it. To evaluate the overall trend of the wages and salaries for the industries deflated by means of the input methods, it would be necessary to separate the part relative to justice. In this case, it would be possible to analyse how the stratification adopted with the average wages method allows obtaining a more stable index compared to the one that would have been obtained by simply considering the variation rate of the full-time equivalent workers.



### 2.1.2 Other components of the output costs

#### *The other taxes on production*

These taxes were deflated by using of the Average Wage Method, considered in the case of the deflation of Wages and Salaries because the most relevant part is given by the Regional Tax on Productive Activities (IRAP), established in 1998 that is basically levied on the labour costs

### *Intermediate consumptions (P2)*

The intermediate consumptions were deflated, using input price indices, relative to the goods and services acquired by the industries considered and used in the production processes. These indices result from some specific elaborations carried out on the prices indices, in the deflation procedure of the annual value added by industry<sup>18</sup>. The estimates of the input prices were calculated as a weighted average of prices at national production for intermediate uses and the average unit values at import of all industries that provide intermediate input to the industry considered<sup>19</sup>. As already mentioned the FISIM component has been separately deflated.

### *Consumption of fixed capital (K1)*

The estimate of the consumption of fixed capital in volume terms required to construct the corresponding series of investments obtained by means of the deflation of the series at current prices. The calculation of the deflators is based on the series of gross fixed capital formation by owner industry and by good for the total economy.

## 2.2 Output methods

The output methods were applied to Education and Hospital services. These industries provide services to individuals and the consumption of these services requires individual initiative by the person interested.

The applicability of the output methods has been studied for other health and social services directly produced by Government. In this experimentation, some indicators were used relative to specialist assistance drawn from the Ministry of Health data adequately integrated with those published by the Agency for Regional health Services. The lack of details for such data and the lack of sufficiently long time series, despite being in full accordance with the superiority of the output methods as by Eurostat, have led us to continue using input methods while waiting for a higher coverage and standardisation of the sources and the guarantee of their stability over time. Anyway the public production of these outpatients services is very limited as they are mainly produced by market producers and provided to the individuals as social transfers in kind.

### *2.2.1 Health*

The measurement in volume terms of the output of the hospital activities branch exclusively concerns the services supplied to in-patients. The complementary activities, functional in supplying the service itself, are included in NACE L. The method for estimating the value of output at prices of the previous year strictly concerns the production of Hospital services; these services fall into the category of hospital assistance produced by using own hospital facilities and personnel employed by the National Health Service.

The introduction of the measurement at prices of the previous year represented an opportunity to apply the volume index method based on Diagnosis Related Groups (DRG). The application of this classification replaced the previously used method, in which the indicator, which was made up of the number of patients subdivided into treatment units according to grouping of hospital disciplines, represented a proxy of the method currently applied. The DRG classification is based on a system that classifies hospital discharges into groups that are medically meaningful and as homogenous as possible with regard to the volume and type of assistance resources consumed during hospitalisation.

The use of an index based on the number of discharged patients, classified by DRG, is recommended by Eurostat in the *Manual on measuring prices and volume in National Accounts*.

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<sup>18</sup> "Inventory on sources and methods for the calculation in volume". Istat, 2004

<sup>19</sup> For further details, see "Inventory on sources and methods for the calculation in volume". Istat, 2004

The clinical cases treated, classified by DRG, represent the basis for the remuneration procedure for hospital services, that is to say, how much the National Health Service should have to reimburse to the hospitals for the services supplied.

The DRG classification applied in Italy is made up of 492 DRG, aggregated, in turn, into 25 Major Diagnostic Categories (MDC) which include all the illnesses concerning a single organ or system, following the division into sectors by the International Classification of Diseases (ICD). The basic set of fees defined at a national level is made up of three sections, respectively concerning:

1. Fees for hospital assistance for acute cases, supplied in relation to ordinary in-patient care and day hospital<sup>20</sup> ;
2. Daily fee for ordinary in-patient care in the long-term hospitalisation wards<sup>21</sup>;
3. Fees for hospital rehabilitation services supplied in relation to in-patient care.

The general criteria for the application of the set of fees include, for the services mentioned in point 1, two different fees (one for ordinary in-patient care and the other for single day hospitalisation and Day hospital), as well as an increase per day, which must be applied if hospitalisation lasts longer than the limit value indicated in the set of fees.

Services in the long-term hospitalisation wards are remunerated by each day of hospitalisation, as is the case of rehabilitation services, for which provision is also made for a 40 percent abatement in the case in which hospitalisation lasts longer than a period of 60 days.

## Sources

### Quantities

The information necessary to attribute correctly a DRG to a hospitalisation event is derived from the *Hospital Discharge Form*<sup>22</sup>.

The Hospital Discharge Form (SDO) is a continuous survey of the information concerning each patient discharged from public and private hospital throughout national territory.

This survey describes the clinical aspects of in-patient care (diagnosis and relevant symptoms, surgery, diagnostic-therapeutic procedures, prosthesis implants, discharge procedures) as well as the organisational aspects (for example: hospitalisation and discharge operative unit, internal transfers, subject sustaining the costs of in-patient care).

The SDO, therefore, contains the basic information necessary in order to associate each in-patient care with the corresponding DRG, and therefore to determine the cost as indicated by the Ministry of Health.

The new estimation method used for the measurement of hospital services was introduced for the period 2000-2005. The SDO are available up until the year 2003. The delay in the availability of the data sources has required for the two most recent years, a different estimation method based on other sources of information, which will be discussed further on.

For each year, the informative basis of the total survey is made up, on average, of about 13 million SDO concerning discharges from public and private care institutes. For each discharged patient the economic value of in-patient care is calculated.

The universe of reference is made up of public hospitals<sup>23</sup> only, and, in the period between 2000 and 2003, is made up of more than ten million discharged patients for each year. The distribution of discharged patients among the three types of activities (Acute, Long-term and

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<sup>20</sup> **Day Hospital** is a hospital treatment procedure in which the patient enters the hospital and leaves in the evening, without staying the night, returning a number of times until he/she completes a cycle of cures, on the other hand, **ordinary hospitalisation** is characterised by the patient sleeping over for at least one night.

<sup>21</sup> **Long-term in-patient care**: This is the recovery of patients discharged from the wards belonging to the "long-term hospitalisation" discipline (Code 60 in the survey forms of the Health Informative System).

**Rehabilitation in-patient care**: The hospitalisation of patients discharged from the wards belonging to the disciplines of the "Spine unit" (code 28), "Recovery and rehabilitation" (code 56), "Neuro-rehabilitation" (code 75), and hospitalisation in institutes dealing with rehabilitation only (except for long-term in-patient care).

**Acute in-patient care**: All cases discharged from wards other than those classified as rehabilitation or long-term in-patient care.

<sup>22</sup> Survey (SAL\_00018) entitled "Discharged patients from public and private care institutes", inserted in the National statistics programme 2005-2007 and previous editions.

<sup>23</sup> The definition of public hospital applied by Istat is different from the definition applied by the Ministry of Health: ISTAT defines "public" the institutes that are classified among the General Government in the National Accounts System in accordance to ESA95.

Rehabilitation In-patient Cares) for ordinary in-patient care and day hospital is indicated in the following table.

**Table 1: Percentage of discharged patients by type of in-patient care and activity**

<b>Type of in-patient care</b>		<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
Ordinary	<i>Acute</i>	75.2	72.8	70.9	68.7
	<i>Long-term</i>	0.4	0.4	0.4	0.5
	<i>Rehabilitation</i>	0.7	0.7	0.7	0.7
<b>Total Ordinary</b>		<b>76.3</b>	<b>73.9</b>	<b>72.0</b>	<b>69.9</b>
Day Hospital	<i>Acute</i>	23.4	25.8	27.7	29.8
	<i>Long-term</i>	0.0	0.0	0.0	0.0
	<i>Rehabilitation</i>	0.3	0.3	0.3	0.3
<b>Total Day Hospital</b>		<b>23.7</b>	<b>26.1</b>	<b>28.0</b>	<b>30.1</b>
<b>Total</b>		<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

### *Costs*

With regard to the cost, the source of data is made up of the sets of fees defined at a national and regional level based on which the National Health Service refunds for the services supplied.

The Ministry of Health laid down the general criteria for establishing the fees of hospital services. The regions and autonomous provinces can choose the procedures for applying the fees, which may be articulated according to their own needs; for example they can be modified on the basis of the different types of suppliers and/or on the basis of the complexity of the treated cases. In the meantime, the regions and autonomous provinces have the chance to yearly update the fees valid in their own territory. The updating of the fees was not done regularly, so having studied the available set of fees it has been chosen, and used as a starting point for the calculation, the set of fees of the Umbria region. These refer to the period of 1997-2001, 2002-2004, and 2005. The degree of coverage that one obtains by applying these sets of fees is higher than the other cases examined.

From these sets of fees we proceeded by interpolating them in order to determine yearly fees that are the basis for the calculation at price of the previous year and therefore supply an actual representation at price of the previous year. The degree of coverage obtained in this manner was satisfactory.

Costs based on fees<sup>24</sup> incorporate the length of in-patient care, since this is a necessary variable for the economic evaluation of the discharge. In the cost calculation, in fact, the amount to be applied per day is taken into account when the duration of in-patient care is longer than the limit established in the regional set of fees. The daily fee is multiplied by the number of days exceeding the limit. The cost calculated in this way, therefore, forms a more reliable measurement of efficiency in the management of the treated cases.

The set of fees applied, furthermore, takes into account different fees of services in relation to the type of structure supplying the service. Based on their structural/organisational complexity, the care institutes are classified in three levels (Structures included in the health emergency network with first level DEA<sup>25</sup>, Structures included in the health emergency network with second level DEA, Other structures), to which a basic regional fee increase of up to 20 percent is applied.

The final result of the procedure is made up, for each year, of two datasets concerning the output at current prices and at the prices of the previous year. These datasets form an exhaustive group of data concerning discharges and their cost, stratified according to the following variables: Region, Type of In-patient Care, Type of Institute (Public or Private), MDC,

<sup>24</sup> BURGIO A., SOLIPACA A., Gli anziani in Italia: costi e aspetti sociali dell'ospedalizzazione, MECOSAN – Management ed economia sanitaria, N. 38, 2001.

<sup>25</sup> DEA: Emergency Acceptance Department



DRG, Type of Activity (Acute, Rehabilitation, and Long-term In-patient Care), and Days of hospitalisation in ordinary recovery, Days of hospitalisation in Day Hospital. The database formed at this level of detail makes it possible to summarise the costs according to one or more variables. It is therefore possible to construct a Laspeyres index by type of recovery and activity, or a global index as a summary of indices further broken down.

### Calculating the volume index

The index used for the volume measurement of the hospital services is a PPY Laspeyres volume index, in which the weighting is made up of the cost of discharge sustained in the year t-1 by type of service offered and the quantities are represented by the patients discharged from the public hospitals, classified by DRG in the year t:

$$L_{t,t-1} = \frac{\sum_{i=1}^2 \sum_{j=1}^3 \sum_{h=1}^{492} p_{i,j,h,(t-1)} \cdot q_{i,j,h,(t)}}{\sum_{i=1}^2 \sum_{j=1}^3 \sum_{h=1}^{492} p_{i,j,h,(t-1)} \cdot q_{i,j,h,(t-1)}} \times 100$$

where:

- i=1,2 is the type of In-patient care (Ordinary, Day Hospital)
- j=1...3 is the type of activity (Acute, Rehabilitation, Long-term)
- h=1,...,492 DRG
- p is the average cost per discharged patient
- q number of discharged patients

A correction was applied to the index for qualitative changes in the service provided, in coherence with requests from Eurostat. The variable considered for the correction is based on the availability of large diagnostic apparatus with high-tech content at a regional level.

#### 2.2.1.1 The quality of hospital service

In this case, as for education, a quality correction has been implemented, based on the input used in the production of the health services. The literature acknowledges that the DRG, based method for health should already capture quality changes. Nevertheless the increase in the availability of technical equipment adds a value to the service. In fact, by comparing a structure in two periods,  $t_1$  and  $t_2$ , with the same number of patients hospitalised in the two periods, one might agree that if the structure, in time  $t_2$ , had more apparatuses (ultrasound, apparatus for dialysis, shadow-free operating lamps, etc.), then the service too must have "improved". If one wishes for an index to measure the overall variation of service over time, the index that include also this qualitative factor should give evidence of improvement of the health structures. In order to achieve this, variables that could express a qualitative improvement in the structures were collected. In particular, from Istat<sup>26</sup> sources, data were collected, at a regional level, on the large diagnosis apparatuses present in the hospitals, divided by type of in-patient care: day hospital and ordinary hospitalisation.

Day hospital	Ordinary hospitalisation
Ultrasound	Monitors
Computed axial tomography	Magnetic resonance tomography
Haemodialysis apparatus	Pulmonary ventilator
Selective multi-parametric analyser	Computerised gamma chamber
Radiology Group	Anaesthetics apparatus
Remote controlled table for radiology apparatus	Shadow-free operating lamp
Automatic analyser for immunochemistry	Automatic differential globule counter
Computerised gamma chamber	

<sup>26</sup> Structure and activities of the care institutes- various years

The apparatuses surveyed were, then, divided into the two types of in-patient care according to the characteristics of the clinical exams associated with them. One may also notice that some items that are listed in one section can also be used in the other, and vice versa. The distinction is based mainly on the characteristics of the instrument and of the related uses.

The formation of a summary index, separately calculated for the two kind of care followed the procedure described below.

For each year of reference, the aforementioned variables are collected with regional details. In order to make the variables compatible, they were evaluated in terms of incidence of the regions on the national total of the surveyed phenomenon. Obviously, each of the variables under examination contains a characteristic distribution within the territory, and therefore, in order to summarise them, the main component procedure (ACP) was applied. This procedure makes it possible to reduce the space of the variables into a space with smaller dimensions, where the new factors (or main components) are obtained as a linear combination of the previous variables, reducing to a minimum the loss in variability of the data (inertia).

In particular, the used methodology showed that the first factor explained about 93% of the entire inertia, and was, therefore, strongly indicative of the information contained in the data. Thus, the first factor was regressed on the basic variables, in order to quantify the effects of unitary changes in the basic variables on the dependent variable (first factor) by estimate of the regression coefficients.

Formally,

$$F_1 = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n$$

where

- $F_1$  is the first principal component;
- $X_i$  is the i-th variable listed on the previous table;
- $\beta_i$  is the regression coefficient of the i-th variable.
- $i = 1, \dots, 8$  for day hospital;  $i = 1, \dots, 7$  for ordinary hospitalisation;

The relative contributions of each variables are given by

$$\lambda_i = \frac{\beta_i}{\sum_{i=1} \beta_i}$$

Finally, in order to quantify the annual dynamics of the quality, we calculated the variation of the per capita equipment per inhabitant between the year t and the year t-1 for each basic variable. A synthetic measurement of the variation in quality by region was therefore obtained by means of an arithmetic weighted average of the variations of the variables with weights equal to the corresponding contributions.

**Tab.1 Contributions of variables in day hospital care**

	2000	2001	2002	2003
Ultrasound	0.122	0.118	0.118	0.118
Computed axial tomography	0.124	0.124	0.124	0.125
Haemodialysis apparatus	0.129	0.134	0.135	0.132
Selective multi-parametric analyser	0.130	0.130	0.124	0.126
Radiology Group	0.123	0.123	0.126	0.128
Remote controlled table for radiology apparatus	0.132	0.130	0.134	0.134
Automatic analyser for immunochemistry	0.132	0.130	0.127	0.131
Computerised gamma chamber	0.109	0.112	0.112	0.106
Total	1.000	1.000	1.000	1.000
<b>Inertia explained by 1° factor</b>	<b>0.930</b>	<b>0.940</b>	<b>0.931</b>	<b>0.922</b>

**Tab.2 Contributions of variables in ordinary hospitalisation**

	2000	2001	2002	2003
Monitors	0.143	0.147	0.145	0.146
Magnetic resonance tomography	0.140	0.145	0.131	0.131
Pulmonary ventilator	0.132	0.133	0.137	0.138
Computerised gamma chamber	0.149	0.140	0.145	0.146
Anaesthetics apparatus	0.153	0.154	0.159	0.159
Shadow-free operating lamp	0.128	0.125	0.127	0.129
Automatic differential globule counter	0.155	0.156	0.156	0.152
Total	1.000	1.000	1.000	1.000
<b>Inertia explained by 1° factor</b>	<b>0.909</b>	<b>0.915</b>	<b>0.897</b>	<b>0.895</b>

Table 1 and table 2 contain, for each year, the contributions of each variable. Both Table 1 and Table 2 show a little difference in terms of contributions among the variables in question, and a significant level of invariability over time.

For example by using this methodology the quality correction used for the day hospital care is shown in the following table. The quality factor has been used as a multiplier of the index numerator.

**Table 3. Trend of the quality index in day hospital**

	2001 /2000	2002 /2001	2003 /2002
<b>Quality index</b>	105.5	102.6	102.3

#### *Estimate for the most recent years*

As already mentioned, the lack of information on the discharge cases made it necessary to resort to alternative data sources for the two most recent years of the series.

These are based on the monthly flows of discharges distinguished by ordinary hospitalisation and day hospital, which form the subject of observation in the "Rapid survey on discharges from care institutes"<sup>27</sup>, carried out by Istat.

Based on the structure of the discharges by DRG and type of hospitalisation in 2003 (last year of the SDO), we defined the distribution of discharges in 2004 and in 2005 by DRG and type of hospitalisation, the totals of which are derived from the results of the aforementioned survey, in the theoretical event of unchanged case mix. The discharges structure obtained in this way, together with the sets of fees for the two most recent years, enters in the calculation of the volume index for the remaining two years of the series.

#### *2.2.2 Education*

As it was the case for Hospital services, the measurement in volume terms of the output of Education strictly relates to the services typical of the sector, that is to say teaching at various levels and student support<sup>28</sup>.

According to the Eurostat Manual on prices and volumes an ideal measurement is represented by the "*quantity of teaching received by the students*", understood as the total number of teaching hours per student. If it is impossible to obtain this information, Eurostat suggests applying, as a proxy, the number of students, where the ratio between students and teaching hours remains unvaried over time. The method is included in the A methods only if the indicator used is suitably correct to account for the variations in the quality of the service offered.

The semi-public nature of educational services implies that their correct measurement must account for the scale of user-ship and for the possible congestion that an alteration in the quality of the service may cause. The breadth of use and, therefore, the overcrowding were

<sup>27</sup> Survey (IST\_00091) inserted in the National statistics programme 2005-2007 and previous editions.

<sup>28</sup> General activities, functional to the supply of the service itself, since they guarantee its regulation and organisation, are classified under NACE L.

introduced since the beginning of the use of output measures for the non market sector as a corrective factor for the quality changes in the service of scholastic education.

As it will be seen further on, the corrective factor chosen for university education is different.

The public production of educational services is divided into the followings activity areas:

- School system
- Vocational training
- University education
- Subsidiary services to education

The index used in order to estimate the output at the prices of the previous year is the Laspeyres volume index, in which the weighting consists of the unitary cost of the single types of service produced, incurred in the previous year by the service provider, and the quantities are represented by the quantity indicators calculated on the basis of the number of students. The index used for the synthesis represents a summary of the indices relative to each type of service. The corrections for the quality changes are included in the calculation of the indices concerning scholastic education and university education.

The following table indicates the composition of current expenditure for the production of educational services by kind of service. The relevance of scholastic education is evident.

**Table 1: Percentage composition of education output by type of service (current prices)**

Type of service	2000	2001	2002	2003	2004	2005
<i>School system</i>	87.2	86.7	86.5	86.8	85.9	86.2
<i>Vocational training</i>	4.3	4.5	4.3	4.1	4.5	4.4
<i>University education</i>	8.1	8.3	8.7	8.6	9.0	8.8
<i>Subsidiary services to education</i>	0.4	0.5	0.6	0.6	0.5	0.5
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

In the following paragraphs, the sources and methods used for deflating each type of educational service will be illustrated.

### 2.2.2.1 School system

Public school system is supplied in state schools managed by Ministry of Education, University and Research, and in the other public schools managed by local authorities: Municipalities, Provinces and Regions.

Scholastic education is supplied mainly in state schools, and is divided into four levels: pre-primary education, primary education, lower secondary and upper secondary education.

#### Sources

In the volume index the quantities are represented by the number of pupils in state schools and non-state schools.

The index is calculated at the maximum breakdown degree. This means that the number of students of state and non-state schools is broken down into the four levels of education and, in upper secondary education, by type of institute (classical lyceum, scientific lyceum, teacher-training institutes and schools, vocational institutes, technical institutes, art institutes, art lyceums). Detailed breakdown of the basic data is essential in order to ensure homogeneity among the elementary indices and the costs assigned to them.

The corrective factor for changes in quality of the service offered is based on the number of pupils per class. Classes are divided by education level, too.

At the basis of correction<sup>29</sup> for the congestion of classes, one finds the theory that, from a certain level of production onwards, the quality of service supplied tends to diminish. The

<sup>29</sup> - D. Guerrucci (ISTAT), *Volume indices of non-market education services supplied by General government sector*, paper presented at the meeting of Eurostat Task Force on price and volume measures for Education

- D. Guerrucci in: G. A. Certomà, V. Lo Moro, R. Malizia (edited by), *Misura e valutazione dei servizi pubblici*, Il Mulino, 1995

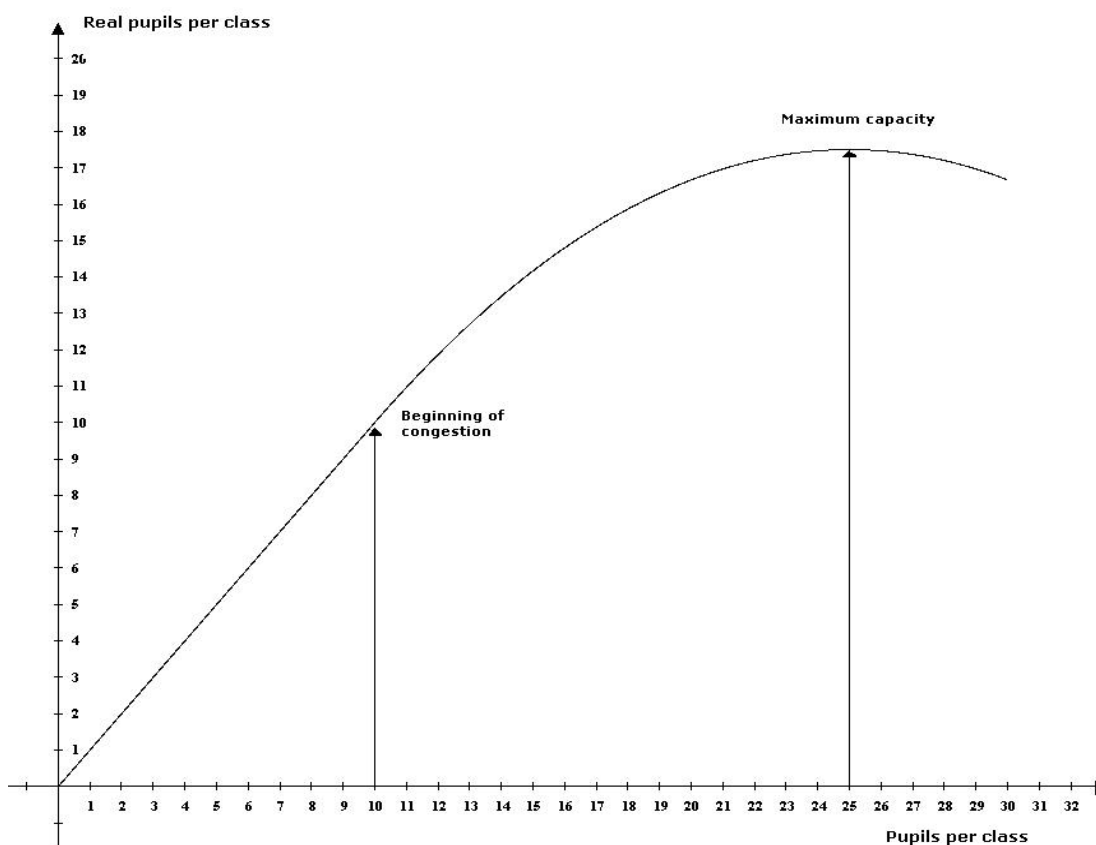
semi-public type nature of the educational service implies that it is plausible to suppose that as the number of students per class increases, the individual attention that a teacher may dedicate to each of them decreases. Based on these observations, a conversion function was constructed, which takes on a linear form for the indicator values below the level at which congestion starts, and a non-linear form, similar to a conventional production function, for higher values. Furthermore, the function reaches its maximum in the point of maximum capacity, beyond which the service is overcrowded.

The conversion function transforms the actual number of pupils into a number of "standard or real" pupils who have received a service that can be defined as "standard" quality. The variation respect to the previous year in the number of standard pupils is used to correct the quantity indicator based on the actual number of pupils. The correction takes place, for each level of education, on the numerator of the index<sup>30</sup>.

**Figure 1: Estimate of conversion function for primary education**

$$q = f(n) = \begin{cases} n & 0 \leq n \leq 10 \\ -1/30n^2 + 5/3n - 10/3 & n > 10 \end{cases} \quad \max f(n) = f(25)$$

n = number of pupils



Both the number of pupils and the number of classes in state and non-state schools are data and are available until the most recent year of the series to be deflated.

The breakdown of the data on quantities by level of education is perfectly adaptable to the structure of the costs of production. These are analysed by function, according to the Cofog

<sup>30</sup> In defining the conversion function, the minimum and maximum number of pupils per class was inserted as parameters. The dispositions that regulate the number of pupils per class (or sections for preschool education), are contained in the Ministerial Decree n° 331, 24 July 1998, and include a minimum of 10 pupils per class in the primary schools, up until a maximum of 25 for all schools except for the upper secondary schools, for which differentiated rules are contemplated for the different types.

classification. The Division 9 - Education, divides the cost items that form the output value (compensation of employees, intermediate consumption, other taxes on production, consumption of fixed capital) into sectors of activity. For the part concerning services provided to individuals (groups from 9.1 to 9.6), the education expenses are classified in level categories based upon ISCED 97<sup>31</sup> classification:

- Pre-primary education (9.1.1)
- Primary education (9.1.2)
- Lower-secondary education (9.2.1)
- Upper-secondary education (9.2.2)
- Post-secondary non tertiary education (9.3.0)
- First stage of tertiary education (9.4.1)
- Second stage of tertiary education (9.4.2)
- Education not definable by level (9.5.0)
- Subsidiary services to education (9.6.0)

The volume index for school system used is a Laspeyres index, which takes on the following form:

$$\frac{\sum_{i=1}^{n.\_of\_levels\_of\_education} (P_{i,(t-1)} \cdot q_{i,(t-1)}) \cdot \frac{q_{i,t}}{q_{i,(t-1)}}}{\sum P_{i,(t-1)} \cdot q_{i,(t-1)}} = \frac{\sum_{i=1}^{n.\_of\_levels\_of\_education} P_{i,(t-1)} \cdot q_{i,t}}{\sum P_{i,(t-1)} \cdot q_{i,(t-1)}}$$

Where:

$i$  is the level of education (pre-primary, primary etc)  
 $t=2000...2005$  adopting predominance criteria, the generic school year  $(t-1)/t$  corresponds to the year  $t$

$\frac{q_{i,t}}{q_{i,(t-1)}}$  quantity indicator of level of education  $i$

$(P_{i,(t-1)} \cdot q_{i,(t-1)})$  weight associated to level of education  $i$  in the year  $t-1$ ;

At the numerator, for each level of education, the value of production is calculated at the previous year's prices. This index might be separately calculated for state education and for non-state education.

### 2.2.2.2 University education

The field of observation of the public university education is defined as the state universities and the non-state universities, that under Regulation ESA95, are included in the General Government sector S13<sup>32</sup>.

The production of services supplied by universities is split in two CPA classes<sup>33</sup>: Research and Development, for the part related to research, and Education, for the part concerning didactic services. The first, as seen in a previous paragraph, is deflated with the input method, while the second one, here illustrated, is deflated with the output method.

Considering the specific nature of the Italian university system<sup>34</sup> it's not feasible to carry out statistical and/or administrative surveys that give an estimation of the teaching hours received by each enrolled student. As in the case of scholastic education, it is unworkable to apply

<sup>31</sup> Isced 97 is the latest version of the International Standard Classification of Education, used by Oecd, Unesco and Eurostat in the production of statistical indicators on education for international comparison.

<sup>32</sup> Private universities belonging to sector S13 are: Libera Università di Bolzano, Università della Valle d'Aosta. The incidence of their own revenue on the costs does not exceed 50%, and their resources derive mainly from transfers from public institutions.

<sup>33</sup> The division of university production is based on a research carried out by Istat about time length that university professors involve in didactics and research.

<sup>34</sup> Many courses do not have any obligation of attendance; there is no standard number of courses to be attended during the academic year (there are no obstacles for passing from one year to the next).

Eurostat's recommendation, then the number of enrolled students per faculty and/or group of homogenous faculties<sup>35</sup> (see Annex 2), hereafter recalled as faculty, has been used as quantity indicator.

The total number of enrolled students was used because, starting from the academic year 2000/2001, the new didactic system<sup>36</sup> came into force and, as a consequence, the data concerning students in the courses are not homogenous for the periods taken into consideration. The most relevant changes due to the reform are:

- The introduction of two levels of university degree: the degree course lasting three years, and the specialised degree course.
- The possibility of enrolment in a year other than the first one considering the number of credits acquired through professional experience.
- The possibility for students who enrolled under the old system to pass to the courses instituted with the new system with a different legal length.
- The simultaneous presence of degree courses according the old system and the new one.

Given the updated and more exhaustive data-set, with the benchmark revision<sup>37</sup>, it has been possible to calculate a per capita average cost for 18 faculties. This allows capturing the specific nature of each faculty. The model used for estimating the unitary cost per student is defined by using a methodology based on the *standard cost per student*<sup>38</sup>. The method for per capita cost calculation would benefit, in future, from accountability according to cost centres<sup>39</sup> that seem to be implemented by several universities.

#### Data source

To calculate the volume indicator, the average unitary cost indicator, and the quality indicators, the following surveys<sup>40</sup> and databanks, all included in the National Statistics Programme, were used:

1. Survey on University Education carried out by the Statistics Office, Ministry of Education, University and Research, *Enrolled and registered students per academic year: date of reference 31 July*<sup>41</sup>
  - Survey unit: Degree Course (old system), Diploma Course (old system), School aimed at special purposes (old system), Degree Course (new system), Specialised Degree Course (new system), Single Cycle Specialised Degree Course (new system);
  - Variable applied: students enrolled by year of first registration in the university system<sup>42</sup>.
2. Survey on University Education carried out by the Statistics Office, Ministry of Education, University and Research, *Graduates per year*

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<sup>35</sup> It is impossible to use the OECD classification of the university system because the areas do not account for the faculties, but directly classify the various study courses.

<sup>36</sup> The new system is regulated by Decree n° 509 of 03/11/1999, *Regolamento recante norme concernenti l'autonomia didattica degli atenei*, published in the Official Journal n° 2, 4 January 2000.

<sup>37</sup> Before the benchmark revision, the cost was calculated for 7 groups of faculties, see: *Misura e Valutazione dei servizi pubblici*, Il Mulino, Bologna 1995, edited by G. Certomà, V. Lo Moro, R. Malizia; in particular see paragraph 2.4 *L'Istruzione universitaria*.

<sup>38</sup> This methodology has been developed by the "Observatory for the Evaluation of the University System", Ministry of Education, Universities and Research. Please see *"Il riparto della quota di equilibrio del fondo per il finanziamento ordinario delle università. Proposte per il triennio 1998 – 2000"*, DOC 3/98, Ministry of Education, University and Research, Observatory for the evaluation of the university system, June 1998. *Calcolo degli indici di costo standard per studente*, statistical annex to DOC 3/98, Ministry of Education, University and Research, Observatory for the evaluation of the university system, June 1998.

<sup>39</sup> Guerrucci D. in *Certomà, V. Lo Moro, R. Malizia, Bologna 1995*, see pages 152-154: Previously, Istat calculated the average unitary cost per student starting from the unitary costs per faculty of the University "La Sapienza" of Rome.

<sup>40</sup> The production of statistical data on Universities was disseminated by ISTAT until the 1997/98 academic year. Starting from the following year, the surveys and the publication of the results became part of the tasks under the competence of the Ministry of Education, University and Research (MIUR), as established by the ISTAT/MURST agreement, which included the creation of the Informative System for Evaluation (SIU), with the purpose of monitoring the university system. The statistics produced by this SIU do not follow a standard classification and, as a consequence, they can't be used for our purposes. The surveys are part of the National Statistical Programme.

<sup>41</sup> Student enrolled in academic year (t-1)/t: student who, on 31 July of the year t, is found to be up to date with all the payments of the enrolment fees, that is to say that he/she has been found to have paid the last instalment. See: Website, Ministry of Education, University and Research, Office III – Statistics Service, *Main applied definitions*.

<sup>42</sup> Ibidem, Year of first registration: academic year in which a student enrolls for the first time in a study course in an Italian university.

- Survey unit: Degree Course (old system), Diploma Course (old system), School aimed at special purposes (old system), Degree Course (new system), Specialised Degree Course (new system), Single Cycle Specialised Degree Course (new system);
  - Variable applied: graduates enrolled by year of first registration in the university system<sup>43</sup>.
3. *Database of the degree courses*, Statistics Office, Ministry of Education, University and Research
- Survey unit: Degree Course (old system), Diploma Course (old system), School aimed at special purposes (old system), Degree Course (new system), Specialised Degree Course (new system), Single Cycle Specialised Degree Course (new system);
  - Variable applied: legal length of the degree course.
4. *Database of professors* (Ordinary Professor, Associated Professor and Researcher), Statistics Office, Ministry of Education, University and Research, date of reference 31 December
- Survey unit: faculty per athenaeum;
  - Variables applied: number of the ordinary and associated professors, number of the researcher.
5. *Survey on the final balance statements of university bodies*, Istat: calendar year
- Survey unit: university.

The following variables from various surveys have been used to apply the model for calculating the *standard cost per student*: students per athenaeum, equivalent professors per athenaeum, costs of production per athenaeum, enrolled students per faculty and per athenaeum, equivalent professors per faculty and athenaeum.

For calculating the quality indicators, on the other hand, the variables are as follows: enrolled students per year of registration per degree course and per faculty; graduates based on the year of first registration per degree course and per faculty, legal length of the degree course.

Since the reference dates of the various surveys are different, the students enrolled in the 2004-2005 academic year, surveyed on 31/07/2005, were used to calculate the volume indicator concerning 2005, the average unitary cost indicator per student for each faculty and the quality indicators.

#### *Model for the formation of the unitary cost per faculty*

The per capita average cost<sup>44</sup> per enrolled student is calculated for each year. In order to estimate the unitary cost of each students, by faculty and for each year, a functional correlation was supposed in which the costs of production for education<sup>45</sup> in different universities ( $C_t$ )<sup>46</sup> depend on the number of equivalent professors ( $D_t$ )<sup>47</sup> and on the total number of enrolled students ( $S_t$ ).

The underlying theory is that the overall cost for education in the public university system is:

$$C_t = \beta_{1,t}S_t + \beta_{2,t}DE_t + \varepsilon_t \quad [1]$$

Where:

$t = 2000, \dots, 2005$ , are the years

$C_t = \sum_{i=1}^{62} C_{i,t}$  is the overall cost of production for didactic purposes

<sup>43</sup> See note n. 33.

<sup>44</sup> See note n. 36.

<sup>45</sup> The "Observatory for the evaluation of the university system" takes into accounts also other variables when specifies the equation.

<sup>46</sup> The value of production of each university for didactic activity was estimated considering the following items: (Expenses for running university bodies, personnel expenses, transfers to departments, financial burdens, tax burdens, expenses for running institutes, centres and clinics, corrective amounts, expenses that cannot be classified in other sections). The overall costs were then reduced proportionally to the importance of didactic with respect to research activities.

<sup>47</sup> The value of equivalent professors for each athenaeum and per university and faculty  $DE_{i,l}$  ( $l = 1, \dots, 62$ ), was obtained with the following formula:

$$DE_{i,t} = (ORD_{i,t} + 0,72 ASS_{i,t} + 0,47 RIC_{i,t}) \times \text{didactic production time}$$

In which ORD is the number of ordinary professors, ASS is the number of associated professors and RIC is the number of researchers.



$S_t = \sum_{i=1}^{62} S_{i,t}$  is the number of enrolled students

$DE_t = \sum_{i=1}^{62} DE_{i,t}$  is the number of equivalent professors

$i = 1, \dots, 62$  is the number of universities included in S13.

The regression coefficient for the different years are in table 1

**Table 1: Analysis of the results obtained in the different years with the equation [1]**

	Years					
	2000	2001	2002	2003	2004	2005
R <sup>2</sup>	0,9884	0,9892	0,9888	0,9864	0,9828	0,9883
Production costs (in millions'euro)	3.640.584	3.781.368	4.134.547	4.336.277	4.479.777	4.526.571
Equivalent professors	16.121	16.842	17.988	18.837	18.454	18.796
Enrolled students	1.580.978	1.569.206	1.610.468	1.655.324	1.704.141	1.710.577

Based on [1], one obtains the average cost per student:

$$C_t / S_t = \beta_{1,t} + \beta_{2,t} DE_t / S_t \quad [2]$$

As one can see, the cost is made up of a constant and of a variable part, related to the number of equivalent professors per student.

The relation [2] can be written for each faculty, then per capita cost for the generic faculty J is equal to:

$$c_{j,t} = \beta_{1,t} + \beta_{2,t} f_{j,t}^* \quad j = 1, \dots, 18 \quad [3]$$

where  $c_{j,t} = C_{j,t} / S_{j,t}$  and  $f_{j,t}^* = DE_{j,t} / S_{j,t}$  is the ratio between equivalent professors and students that is different for each faculty.

In order to define an unitary average cost to attribute to each faculty, it is necessary to estimate the various  $f_{j,t}^*$ .

The  $f_{j,t}^*$  can be determined with a simple regression model; thus, for the faculty j, one will have:

$$DE_{j,t} = f_{j,t}^* S_{j,t} \quad [4]$$

Table 2 shows data used as input, while table 3 contains the results obtained.

**Table 2: Total students and equivalent professors per faculty**

Groups	Years											
	2000		2001		2002		2003		2004		2005	
	Enrolled students	Equivalent professors	Enrolled students	Equivalent professors	Enrolled students	Equivalent professors	Enrolled students	Equivalent professors	Enrolled students	Equivalent professors	Enrolled students	Equivalent professors
01 Sciences	125,259	2,914.45	124,760	3,015.68	127,695	3,159.97	133,360	3,279.22	139,885	3,195.45	142,273	3,220.14
02 Pharmacy	42,412	501.92	43,779	523.44	44,207	564.93	46,567	595.07	48,553	581.62	51,863	591.21
03 Medicine and Surgery	97,220	3,378.36	101,264	3,494.03	116,412	3,773.75	123,898	3,954.84	132,785	3,838.57	140,005	3,823.58
04 Engineering	209,534	2,380.59	211,330	2,481.43	216,832	2,608.62	224,309	2,643.37	229,145	2,594.42	229,728	2,744.60
05 Architecture	78,866	624.38	75,158	653.68	75,367	698.45	75,852	731.71	77,158	722.10	77,196	725.76
06 Agriculture	27,204	677.85	26,883	701.20	27,611	739.31	28,837	766.07	29,729	759.84	29,635	767.64
07 Veterinary Medicine	13,794	287.00	13,571	303.33	13,757	326.53	14,143	343.18	14,605	332.82	14,814	337.82
08 Sociology	22,243	69.45	24,777	74.31	23,002	67.82	14,713	75.61	15,186	76.48	14,687	75.47
09 Political science	93,044	558.23	90,194	585.75	91,872	617.34	95,943	663.81	101,900	644.76	101,361	664.53
10 Law	265,301	846.47	252,358	901.22	241,830	977.39	234,532	1,041.16	230,118	1,026.90	225,180	1,058.05
11 Letter	216,385	1,848.92	212,600	1,910.94	220,379	2,045.57	242,890	2,129.78	247,190	2,087.09	248,043	2,118.73
12 Language	42,716	379.06	45,475	399.61	48,939	427.65	52,120	466.84	53,859	456.74	54,495	467.26
13 Cultural Heritage	7,201	40.38	7,259	47.67	7,261	57.85	7,396	59.79	7,390	58.70	6,663	59.50
14 Psychology	31,475	131.22	30,170	139.77	35,386	155.88	44,220	180.13	45,825	186.34	45,355	190.56
15 Economics	214,706	1,055.61	206,755	1,127.68	205,534	1,226.10	207,555	1,312.28	210,493	1,297.91	205,742	1,326.83
16 Education	82,970	314.21	91,576	354.74	102,301	400.52	96,624	434.86	106,464	427.07	109,837	452.66
17 Statistics	6,622	106.78	6,146	111.56	5,366	116.05	4,746	117.74	4,316	114.14	4,000	113.69
18 Exercise and Sport Science	4,026	6.82	5,151	15.86	6,717	23.93	7,619	42.03	9,540	52.59	9,700	58.14
Total	1,580,978	16,121.68	1,569,206	16,841.90	1,610,468	17,987.66	1,655,324	18,837.48	1,704,141	18,453.54	1,710,577	18,796.18

**Table 3: Results of the different equations applying [4] for each faculty**

Groups	Years											
	2000		2001		2002		2003		2004		2005	
	R <sup>2</sup>	fj*	R <sup>2</sup>	fj*	R <sup>2</sup>	fj*	R <sup>2</sup>	fj*	R <sup>2</sup>	fj*	R <sup>2</sup>	fj*
01 Sciences	0,9111	0,0205	0,9190	0,0218	0,9168	0,0224	0,9323	0,0227	0,9239	0,0214	0,9259	0,0213
02 Pharmacy	0,9137	0,0107	0,8996	0,0108	0,9184	0,0118	0,8975	0,0115	0,8631	0,0105	0,8469	0,0097
03 Medicine and Surgery	0,9619	0,0348	0,9652	0,0354	0,9348	0,0332	0,8995	0,0330	0,9011	0,0303	0,9186	0,0285
04 Engineering	0,9749	0,0113	0,9692	0,0116	0,9751	0,0119	0,9474	0,0110	0,9523	0,0107	0,9799	0,0118
05 Architecture	0,9723	0,0074	0,9736	0,0081	0,9772	0,0086	0,9816	0,0090	0,9723	0,0086	0,9675	0,0086
06 Agriculture	0,9229	0,0239	0,9341	0,0253	0,9447	0,0261	0,9467	0,0260	0,9370	0,0251	0,9380	0,0255
07 Veterinary Medicine	0,9490	0,0193	0,9523	0,0207	0,9653	0,0224	0,9790	0,0233	0,9819	0,0222	0,9817	0,0224
08 Sociology	0,8562	0,0023	0,8210	0,0020	0,6305	0,0017	0,7432	0,0040	0,7628	0,0041	0,7829	0,0042
09 Political science	0,9547	0,0057	0,9519	0,0063	0,9473	0,0065	0,9533	0,0068	0,9289	0,0062	0,9637	0,0064
10 Law	0,8941	0,0028	0,8959	0,0032	0,8948	0,0035	0,8936	0,0039	0,8906	0,0040	0,8869	0,0042
11 Letter	0,8994	0,0080	0,9034	0,0085	0,9125	0,0086	0,9155	0,0078	0,9063	0,0073	0,9061	0,0074
12 Language	0,8101	0,0081	0,8150	0,0082	0,8599	0,0083	0,8677	0,0084	0,8580	0,0079	0,8616	0,0080
13 Cultural Heritage	0,9996	0,0056	0,9836	0,0065	0,9898	0,0079	0,9975	0,0080	0,9949	0,0079	0,9843	0,0087
14 Psychology	0,9757	0,0041	0,9685	0,0043	0,9183	0,0042	0,8589	0,0040	0,8845	0,0039	0,8888	0,0040
15 Economics	0,8673	0,0046	0,8676	0,0051	0,8635	0,0056	0,8650	0,0058	0,8642	0,0056	0,8865	0,0060
16 Education	0,8284	0,0033	0,8958	0,0036	0,9173	0,0039	0,9420	0,0044	0,9359	0,0040	0,9273	0,0040
17 Statistics	0,9600	0,0179	0,9515	0,0199	0,9664	0,0235	0,9748	0,0266	0,9717	0,0286	0,9667	0,0307
18 Exercise and Sport Science	0,3135	0,0009	0,7491	0,0027	0,8429	0,0035	0,8225	0,0047	0,8253	0,0048	0,7909	0,0052

Using the relation [3] it is possible to calculate in practice, for the year 2000, the per capita cost for a student enrolled in the generic j faculty,

$$C_j = 162,34 + 205.900,51 \times f_j^*$$

Where for the year 2000

$$162,34 \text{ €} = \beta_1^{\wedge}$$

$$205.900,51 \text{ €} = \beta_2^{\wedge}$$

$f_j^*$  is estimated by the relation [4].

#### Volume index

The index used for the university production is a PPY Laspeyres volume index, in which the weighting is the per capita cost in the year  $t-1$  and the quantity, referring to the current year  $t$ , is the number of enrolled students per faculty.

The index takes on the following form:

$$L_{t/t-1} = \frac{\sum_{j=1}^{18} C_{j,(t-1)} \cdot S_{j,t}}{\sum_{j=1}^{18} C_{j,(t-1)} \cdot S_{j,(t-1)}}$$

where:

$t$  is the time unit

$C$  is the unitary cost of a student of the faculty  $j$

$S$  is the number of students enrolled in the faculty  $j$ .

#### Quality indicators

According to Eurostat recommendation a qualitative correction, measuring the outcome of university, was applied in the volume component. The literature presents various indicators<sup>48</sup> that allow evaluating the results of university production, but it does not give an unique method to measure the efficiency and/or effectiveness of the university.

The methodology applied involved the use of the annual variation of two indicators average, calculated per faculty  $q_{j,t}$ :

<sup>48</sup> See: *Analisi di efficienza ed efficacia del sistema universitario italiano attraverso nuove metodologie statistiche multivariate robuste*, RDR 3/04, Ministry of Education, University and Research, Observatory for the evaluation of the university system, April 2004. It is worth noticing that the analysis applied by the Committee serves the purpose of measuring the effectiveness and/or efficiency for each Italian athenaeum.

- The ratio between the enrolled "regular students" in the course  $SC_{jt}$ <sup>49</sup> and the total number of enrolled students  $S_{jt}$
- The reduction of the distance between the actual number of years for graduation  $LE_{jt}$  and the theoretical length  $LT_{jt}$ .<sup>50</sup>

The corrective factor applied is:

$$q_{j,t} / q_{j,(t-1)}$$

where

$$q_{jt} = ((SC_{jt} / S_{j,t}) + (LT_{j,t} / LE_{j,t})) / 2 \quad [5]^{51}$$

Table 4 shows the quality indicators calculated for the various years.

**Table 4: Actual and theoretical average time for degree, average reduction of distance from the theoretical time per faculty.**

Groups	Years														
	2000			2001			2002			2003			2004		
	Actual time for graduation (LE)	Theoretical time for graduation (LT)	Reduction of distance (LT) / (LE)	Actual time for graduation (LE)	Theoretical time for graduation (LT)	Reduction of distance (LT) / (LE)	Actual time for graduation (LE)	Theoretical time for graduation (LT)	Reduction of distance (LT) / (LE)	Actual time for graduation (LE)	Theoretical time for graduation (LT)	Reduction of distance (LT) / (LE)	Actual time for graduation (LE)	Theoretical time for graduation (LT)	Reduction of distance (LT) / (LE)
01 Sciences	10,18	4,65	0,46	8,77	4,56	0,52	8,02	4,27	0,53	7,67	4,13	0,54	6,90	3,91	0,57
02 Pharmacy	11,07	4,98	0,45	8,91	4,90	0,55	8,75	4,87	0,56	8,47	4,84	0,57	7,94	4,75	0,60
03 Medicine and Surgery	7,52	5,88	0,78	7,18	4,50	0,63	6,32	4,01	0,63	6,05	3,92	0,65	5,88	3,79	0,64
04 Engineering	12,78	5,00	0,39	9,31	4,73	0,51	8,59	4,53	0,53	7,67	4,27	0,56	6,97	4,05	0,58
05 Architecture	15,05	4,98	0,33	10,21	4,89	0,48	9,42	4,75	0,50	8,28	4,46	0,54	8,02	4,39	0,55
06 Agriculture	11,60	5,00	0,43	8,33	4,73	0,57	7,86	4,50	0,57	7,80	4,41	0,56	7,38	4,20	0,57
07 Veterinary Medicine	12,20	5,00	0,41	9,11	4,93	0,54	9,17	4,87	0,53	8,57	4,85	0,57	8,59	4,75	0,55
08 Sociology	7,68	4,15	0,54	7,79	3,99	0,51	7,61	3,97	0,52	8,06	3,87	0,48	7,89	3,80	0,48
09 Political science	8,67	4,00	0,46	8,32	3,89	0,47	8,15	3,85	0,47	7,73	3,81	0,49	6,64	3,61	0,54
10 Law	8,65	4,00	0,46	9,07	3,98	0,44	9,13	3,97	0,44	8,93	3,75	0,42	8,24	3,81	0,46
11 Letter	8,47	4,04	0,48	8,55	4,01	0,47	8,32	3,95	0,48	7,90	3,92	0,50	7,16	3,76	0,53
12 Language	8,46	4,00	0,47	8,25	3,93	0,48	8,00	3,92	0,49	7,50	3,84	0,51	6,88	3,72	0,54
13 Cultural Heritage	8,46	4,00	0,47	9,17	3,97	0,43	8,57	3,94	0,46	8,31	3,89	0,47	8,24	3,83	0,46
14 Psychology	10,03	5,00	0,50	8,88	5,00	0,56	8,83	4,96	0,56	7,26	4,50	0,62	6,43	4,24	0,66
15 Economics	8,76	4,00	0,46	8,65	3,90	0,45	8,12	3,83	0,47	7,56	3,75	0,50	6,75	3,63	0,54
16 Education	7,40	4,09	0,55	7,26	3,96	0,55	7,00	3,82	0,55	7,01	3,81	0,54	6,78	3,82	0,56
17 Statistics	7,84	4,00	0,51	7,36	3,74	0,51	6,92	3,56	0,52	6,55	3,56	0,54	6,21	3,45	0,56
18 Exercise and Sport Science	4,00	4,00	1,00	4,14	3,24	0,81	5,15	3,38	0,66	3,76	3,40	0,90	4,48	3,42	0,76
Total	9,75	4,43	0,45	8,63	4,26	0,49	8,15	4,13	0,51	7,65	4,00	0,52	7,00	3,87	0,53

It is worth noticing that the choice of only two indicators is due to the heterogeneity of the basic data, which, following the changes in the didactic system which took place at the beginning of this period, are not comparable.

For the time being, also whether several indicators could be theoretically calculate, it has been decided to limit the quality adjustment to easily understandable items.

The PYP Laspeyres volume index, corrected with the quality factor for the part concerning university education, becomes:

$$L_{t/t-1} = \frac{\sum_{j=1}^{18} C_{j,(t-1)} \cdot S_{j,t} \cdot \frac{q_{j,t}}{q_{j,(t-1)}}}{\sum_{j=1}^{18} C_{j,(t-1)} \cdot S_{j,(t-1)}}$$

where:

$t$  is the time unit

$C$  is the unitary cost of a student of the faculty  $j$

$S$  is the number of students enrolled in the faculty  $j$

$q$  is quality indicators in the faculty  $j$

<sup>49</sup> Regular students (students who did not exceed the legal length of their degree) were calculated considering the year of first registration in the Italian university. This is not valid for students enrolled in specialised degree courses, introduced with the new didactic system. The indicator is at most equal to one if all enrolled students are attending their proper year of attendance. Those faculties for which the indicator is close to 1 are the most efficient.

<sup>50</sup> The actual time for graduation is calculated for graduates from each degree, considering the year of first registration and then grouping by faculty the various actual times. The theoretical time was calculated considering the legal length of every degree attended by graduates, and then again grouping them by faculty. The correlation between theoretical time and actual time is 1 if all students graduate within the legal duration of the course. In this case, too, if the index is close 1, this means that the university education process has an effective result.

<sup>51</sup> Considering the fact that the two indicators have the same direction, they both tend towards the unit, it was preferred the simplest way of summarising them with an unweighted average in order to measure the efficiency of the educational procedures, supposing that both indicators have the same weight.

### 2.2.2.3 Vocational training

The vocational training courses supplied contribute to output value of Education, in a less relevant manner compared to the scholastic and university education in terms of incidence on the overall expense. Current expenditure is always lower than 5% of the total.

The field of analysis is made up of first level<sup>52</sup> (or basic), second level and IFTS<sup>53</sup> (Superior Technical Instruction and Training) training courses, supplied by the regions and autonomous provinces<sup>54</sup>. The activity of these institutions does not end with the offer of the aforementioned courses<sup>55</sup>.

As far as the costs are concerned, in this case too, the data applied are taken from the classification of expenses by Cofog function. In particular, the function of reference is 9.3.0 – post-secondary non tertiary education.

### 2.2.2.4 Subsidiary services to education

The services provided by the Bodies for the Right to university education (ADISU) concern all the activities supporting the university studies cycle. The right to study is concretely offered by means of services aimed at university students in general and with specific actions for capable and worthy students who live in disadvantaged economic conditions, and for disabled students. The support services are carried out through various forms. The following are among the main interventions: grants, contributions in favour of disabled students, living arrangement services for students from other areas and contributions towards rent, contributions for international mobility, canteens.

The value of output subject to deflation is the value that results from the main activity of the institution supplying the services. All secondary productions, which are allocated outside of the diagonal in the Supply table, are deflated with a suitable index in relation to the products originating from the secondary productions.

For the construction of the Laspeyres volume index, the quantities are represented by the number of meals supplied and by the number of bed places assigned, and the prices are represented at the cost of production of the services.

The data on the quantities are published from the "Survey on the right to university studies", carried out annually by the Ministry of Education, University and Research. The cost structure is derived from the functional classification

### The global volume index

The global index of educational service is a weighted average of the  $L_{h,t}$  mobile-based Laspeyres indices calculated for each type of service. The global index is the following:

$$L_{t/(t-1)} = \frac{\sum_h p_{h,(t-1)} \cdot q_{h,(t-1)} \cdot L_{h,t}}{\sum_h p_{h,(t-1)} \cdot q_{h,(t-1)}}$$

Where:

$$L_{h,t} = \frac{\sum_i p_{i,(t-1)}^h \cdot q_{i,(t-1)}^h \cdot \frac{q_{i,t}^h}{q_{i,(t-1)}^h}}{\sum_i p_{i,(t-1)}^h \cdot q_{i,(t-1)}^h}$$

<sup>52</sup> Training aimed at young people coming out of obligatory schooling

<sup>53</sup> Training aimed at young people with diplomas, university graduates, and people with professional qualifications

<sup>54</sup> The main data source on the quantities, that is to say on the number of students involved, is the publication entitled: "Statistics on professional training: structures, activities and expenses", by the Training Systems Area of the Institute for the Development of vocational training for workers (Isfol)

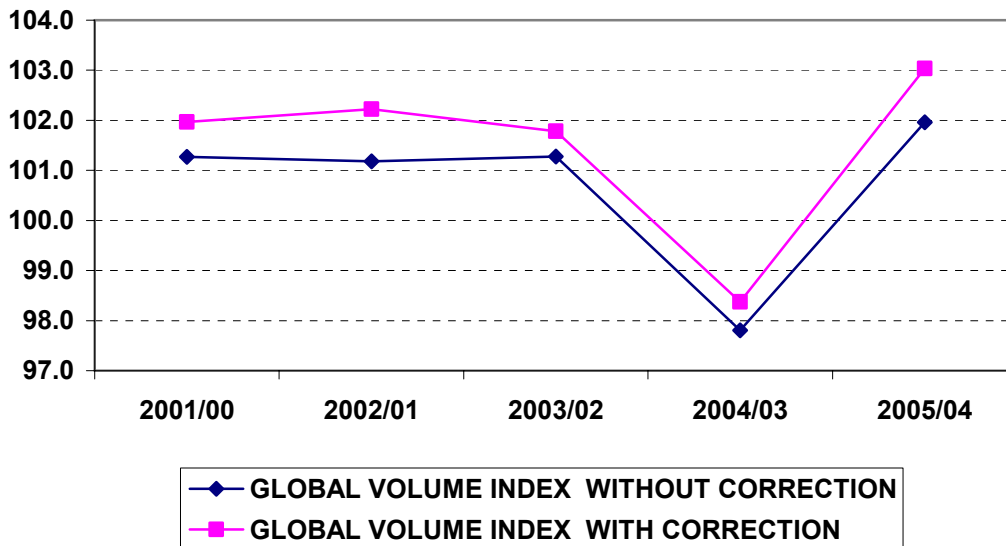
<sup>55</sup> It continues also through the offer of professional training courses for unemployed people, apprentices, employed people and people subject to a risk of exclusion. However, these represent the part of vocational training that cannot be classified as education since it does not fall under the level of education included in the ISCED classification. The production and offer of these courses is classified in function 10 – Social protection.

$h=1, \dots, 5$  is the type of educational service:  
 1) State school  
 2) Public body schools (Local government)  
 3) University education  
 4) Vocational training  
 5) Subsidiary services to education  
 $i$  type of service included in activity  $h$  (in the case of scholastic education, these are the levels of education)  
 $t$  Is the time unit  
 $q_i$  Is the number of students, corrected with suitable quality factors for the services concerning scholastic and university education.  
 $(p_{i,(t-1)}^h \cdot q_{i,(t-1)}^h)$  Is the cost sustained during the year  $t-1$  for supplying each service  $i$  for the activity  $h$

*The effect of the quality adjustments*

As shown in the figure 1, the overall corrections for quality changes produce an increase of output in volume.

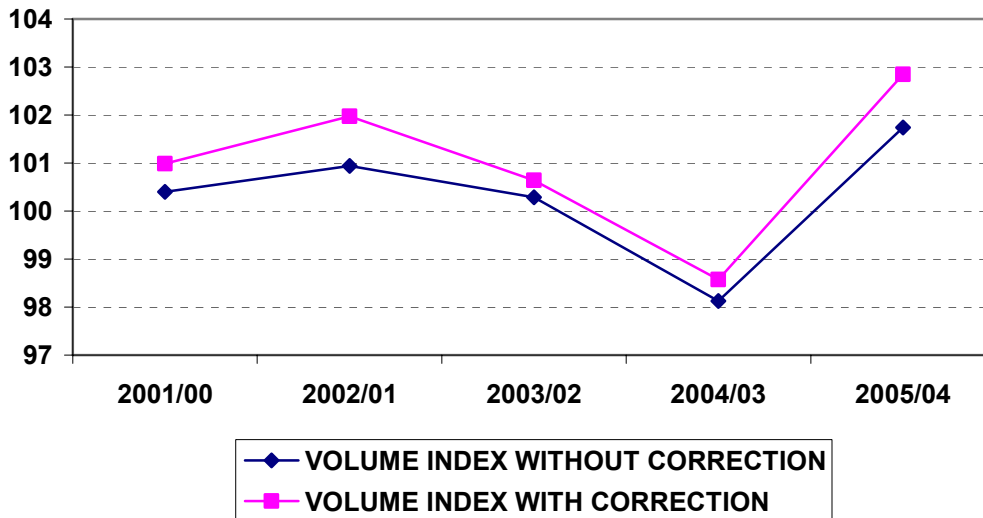
**Figure 1. Global volume index (PPY)**



The correction effect can be attributed at the two factors due to the overcrowding of the classes used in the volume index calculation for the scholastic education (fig. 2) and to the correction based on the two indicators that measure the outcome for the university education (fig.3).

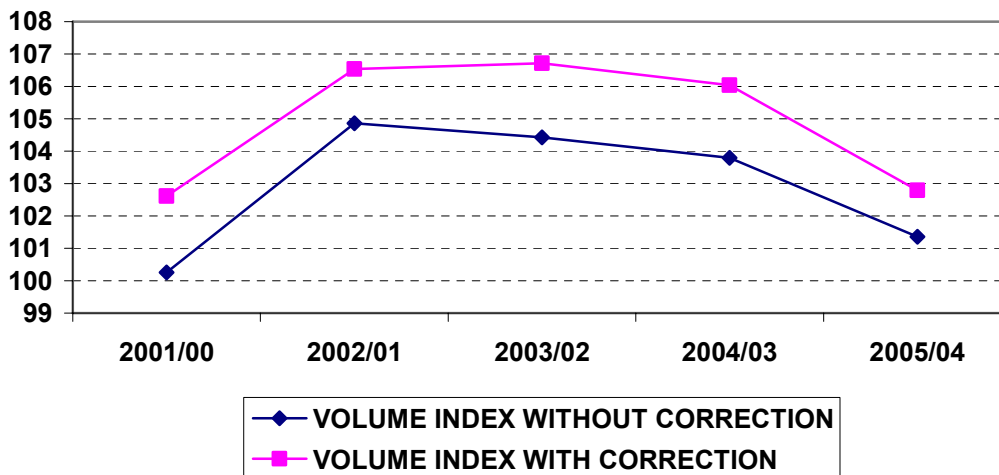
Regarding the scholastic education, the quality adjusted index trend follows the one without correction with a higher difference on 2002/2001 volume index.

Figure 2. Volume index for scholastic education (PPY)



As shown by figure 3, with reference to the university education the two indicators have a different trend between the years 2002 and 2003.

Figure 3. Volume index for university education (PPY)



The trend of the two indicators is influenced by the reform of the didactic system came into force in the academic year 2000/2001.

The effects of the new didactic system can be resumed as a decrease in the enrolled students because of the shorter length of courses since the beginning of the new university system.

Using the quality factor the volume index grows even in the academic year 2002/2003. This trend is determined by:

1. the raise of graduates due to the chance for students who enrolled under the old system to pass to the courses instituted with the new system with a different legal length;
2. the shorter length of graduation time for the new enrolled students in the new system.

After the academic year 2002/2003 the two volume indices have shown the same trend.

## 2.3 Other individual services

The deflation of the industries concerning refuse disposal services, associative organisation activities, activities in radio and television, show business, press, culture, sports and recreation and other service activities was carried out using direct deflation of the production with deflators based on CPI, obtained by aggregation and stratification of the elementary consumers price indices, net of VAT. The consumer price index measures actual price variations, over a period of time, on a group of goods and services purchased on the market and destined exclusively to final consumption by household present in the national territory. The stripping of the VAT weighting on this index is necessary in order to transform the estimates of the consumer deflators per industry into production price indicators for certain types of services. The price indicators obtained in this manner made it possible to directly deflate the value of production of NACE O.

It is important to point out how, following the revision of deflation procedures of the non-market sector, there is still a work in progress related to the deflation with output indicators for the recreational, cultural and the other services of CPA 92.

The main problems that one may encounter using CPA 92 information are as follow:

- Periodicity;
- Level of breakdown of the elementary information;
- Coverage over the territory.

The first difficulty involves obtaining complete time series, updated in coherence with the times necessary for the deflation method. A further problem is represented by the level of detail of the indicators and by their territorial coverage. No available time series indeed contain the separation among general government, non-profit Institutions serving households and the rest of the economy. In these sectors, the data are generally surveyed at an aggregate level for the total economy, and there is insufficient information for elaborating separate procedures for market and non market producers.

These problems consequently made it impossible to move on to an output method but, in a future prospect, the progressive extension and refinement of the information collection methods could make it possible to pass over to a deflation process other than the one that is currently used.

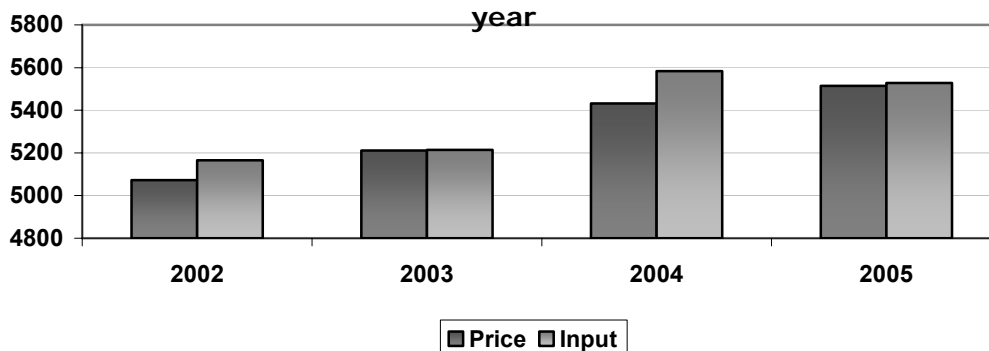
Similar to what was encountered for this sector, studies were carried out concerning the services for management and disposal of refuse, in order to verify the possibility of resorting to a production volume index. Contrary to what was encountered for the recreational and cultural activities industry, in this sector, there is an up-to-date and periodical database, thanks to the surveys and processes run annually by the National Waste Observatory (ONR), by the National Agency for Environmental Conservation and the technical services (APAT) and by the Committee for Vigilance over Water Resources (COVIRI). These data mainly refer to the market sector, that is to say the sector resulting in the most relevant part of total production of the industry.

In light of these observations, we resorted to the information on the consumption price indices, evaluated at the basic prices.

### *Comparison between input and output methods*

The system made with the new processing procedure was conceived in a manner that made it possible to guarantee resorting to more than one deflation method, in order to be able to verify the differences. In this case, once the production of the industries examined had been deflated using the deflators based on CPI, we proceeded to calculate production at the prices of the previous year, also as the sum of costs deflated. The entity of the differences between the two methods, in terms of the total value of production, is not particularly relevant, also in light of the low incidence of the industries in the total calculation of production of General Government (the four industries contribute by only 2% to the overall production).

**Figure 1. Nace O: comparison between price deflation and input deflation. Values at price of the previous year**



## 2.4 Comparisons between input methods (AW) and output methods

The deflation of Government production had been performed by input and output methods. By using these methods two different levels of output are determined. More specifically, by comparing the results of the two methods for Education and Health sectors can be observed different values of implicit deflators.

These differences in the output and deflator are due to:

- trend of economic aggregates forming output at current prices;
- trend of volume indices for the sectors deflated by output method;
- trend of output deflating by input method; in this context, it can be shown as the output trend is mainly due to the compensation of employees. The trend of D1 is important in the deflation elaborations because this is the main part of total production. In particular, with regard to the Education sector, the compensation of employees represents more than 80% of total output.

### 2.4.1 Education

For Education, the comparison between the output values at prices of the previous year obtained with the deflation methods mentioned above shows different values of deflators, with particular attention for the 2002 and 2004 years.

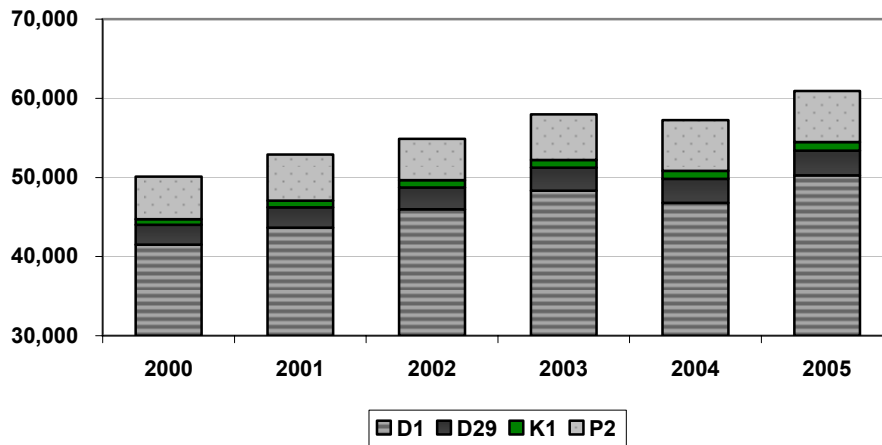
In order to explain these differences, it can be useful to analyse the trend of economics aggregate at current prices.

For the education sector a progressive increase of output and compensations of employees can be shown from 2000 until 2003, with a high value in 2003; in 2004, instead, P1 and D1 show a decrease. In particular, the high value of output in 2003 - due to the renewal of contracts and the intermediate consumption increase - influences the evaluation of the aggregate in volume terms.

The value of output in 2004 depends on the compensation of employees decrease between 2003 and 2004 (-3,2%). Such a decrease influences in different ways the calculations in volume comparing the input and output methods.



**Figure 1. Trend of output components at current prices**



As mentioned, the compensations of employees at constant prices are calculated by adding inputs. The volume indicators used (Laspeyres volume index) in this context is calculated on number of employees, following the criteria established by average wages methods.

$$IL_i^{t/t-1} = \frac{\sum w^{t-1} l^t}{\sum w^{t-1} l^{t-1}}$$

By elaborating data at prices of the previous year with AW methods we obtain a low value of index for the 2004 year (97,5), because of:

- the decrease of D1 between 2003 and 2004 is reflected in the Laspeyres volume index denominator;
- the increase of 2004 volume component is reflected in the numerator of index.

These effects explain why the output value at PPY for 2004 are higher than the output value at current prices.

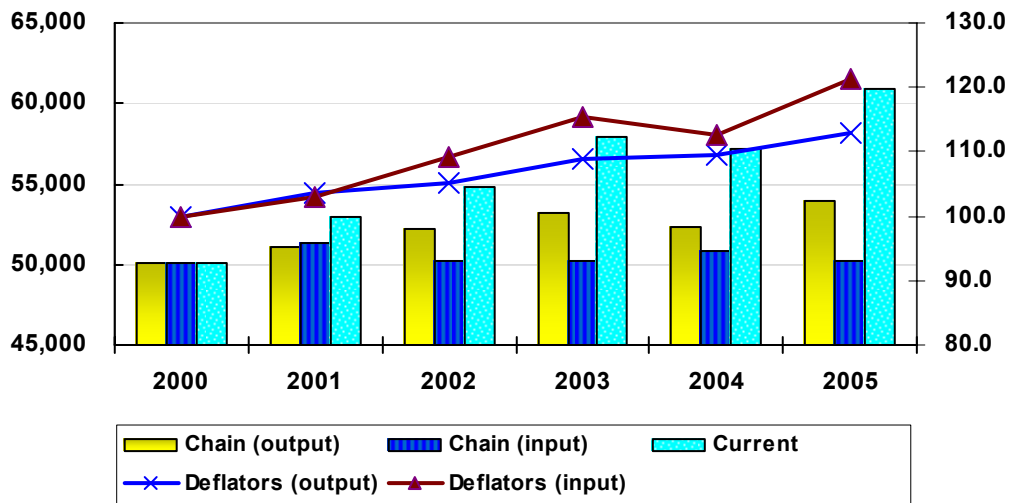
On the other hand, the value of volume index used for deflating the output by the output method helps to balance, at the least partly, decrease of compensation of employees. As a result, the value of deflators is higher (100,4).

**Table 1. Deflators at PPY of Education and Health sectors. Comparison between input and output methods**

Sector	Year	Output	Input
Education	2001	103.5	103.0
Education	2002	101.4	106.0
Education	2003	103.8	105.4
Education	2004	100.4	97.5

The trend of chain values (fig. 2), influenced by PPY values and by current prices values, are more stable. On this issue, one can show a difference by using the two deflation methods for 2003 year for the chain values, too. These effects are due to the methodological differences between input and output methods.

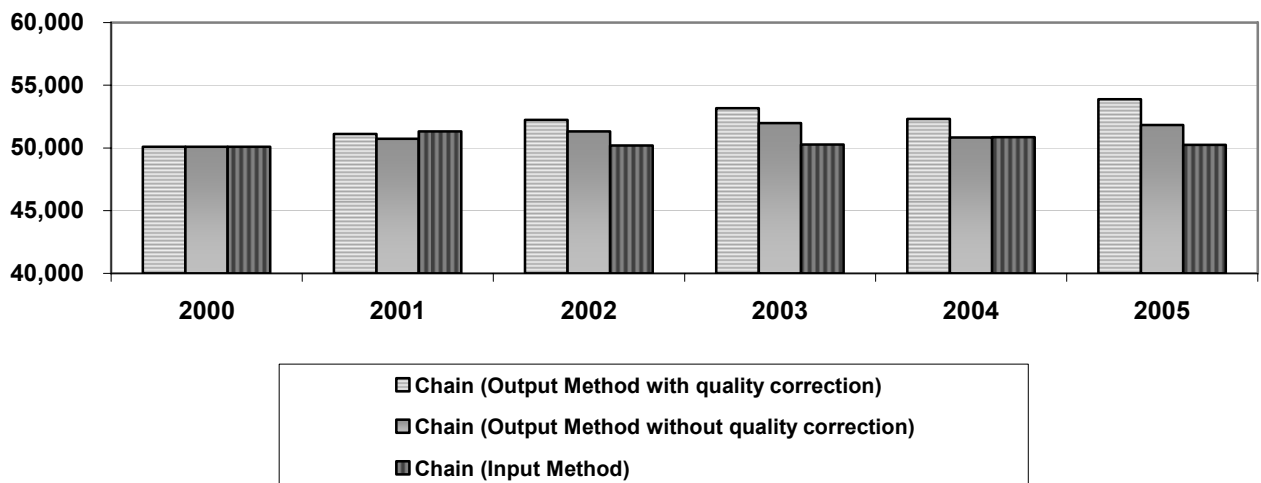
**Figure 2. Education: comparison between input and output methods**



As a general remark, the values of deflators estimated by using input methods are higher than the values obtained by using output methods. This could signal an increase of productivity that is not easy highlighted by using the input method.

For education sector it is worthwhile interesting to observe the output trend in volume terms by comparing the different quality adjustments evaluations and evidencing the effect of quality correction. As underlined in figure 3 this correction determines a value of the output in volume terms higher than the one without quality adjustment. By increasing the weight of volume component this correction reduces the deflator value and the price effect on the variation of aggregates.

**Figure 3. Education: comparison of output calculations**



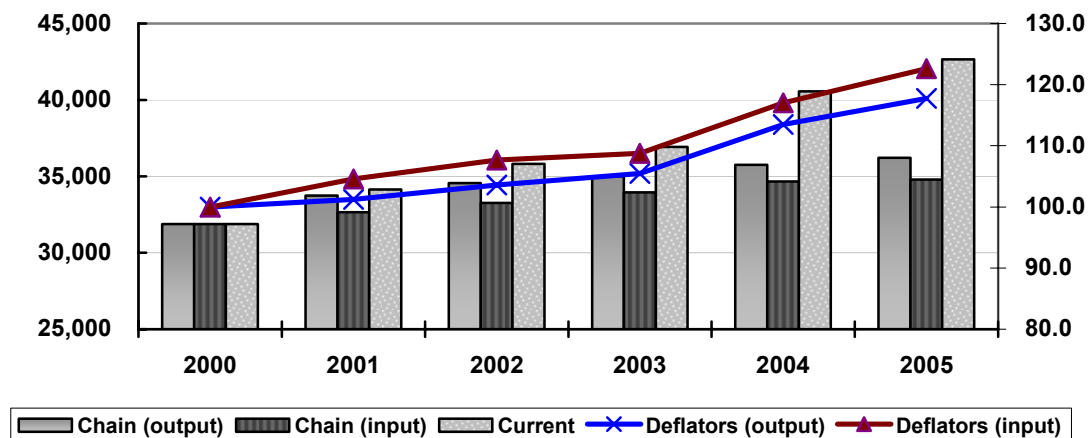
#### 2.4.2 Health

Regarding the Health sector, the difference between the value of deflators obtained on the basis of the aggregates evaluated at PPY through the output and input methods is stricter than the one observed for the education sector.

Sector	Year	Output	Input
Health	2001	101.2	104.6
Health	2002	102.3	102.9
Health	2003	101.8	101.0
Health	2004	107.6	107.6

The deflators trend originated by using input method is strictly related to the trend of aggregate at current prices. The higher values of deflators on 2001 with respect to 2002 is mainly justified by the increase of aggregates at current prices registered between 2000 and 2001.

**Figure 4. Health: Comparison between input and output methods**



By elaborating the deflators with output method, instead, we achieve different values for the first period of the time series (2001 and 2002 years) with respect to the last two years for which, as already described, there are not enough information on the *case mix* of the discharges between ordinary recovery and day hospital.

## ANNEX 1

### The DRG classification used in Italy

DRG	MDC	Kind of DRG	DRG Description
001	1	C	CRANIOTOMIA ETA` > 17, ECCEPPO PER TRAUMATISMO
002	1	C	CRANIOTOMIA ETA` > 17 PER TRAUMATISMO
003	1	C	CRANIOTOMIA ETA` < 18
004	1	C	INTERVENTI SUL MIDOLLO SPINALE
005	1	C	INTERVENTI SUI VASI EXTRACRANICI
006	1	C	DECOMPRESSIONE DEL TUNNEL CARPALE
007	1	C	INTERVENTI SU NERVI PERIFERICI E CRANICI E ALTRI INTERVENTI SU SISTEMA NERVOSO CON CC
008	1	C	INTERVENTI SU NERVI PERIFERICI E CRANICI E ALTRI INTERVENTI SU SISTEMA NERVOSO SENZA CC
009	1	M	MALATTIE E TRAUMATISMI DEL MIDOLLO SPINALE
010	1	M	NEOPLASIE DEL SISTEMA NERVOSO CON CC
011	1	M	NEOPLASIE DEL SISTEMA NERVOSO SENZA CC
012	1	M	MALATTIE DEGENERATIVE DEL SISTEMA NERVOSO
013	1	M	SCLEROSI MULTIPLA E ATASSIA CEREBELLARE
014	1	M	MALATTIE CEREBROVASCOLARI SPECIFICHE ECCEPPO ATTACCO ISCHEMICO TRANSITORIO
015	1	M	ATTACCO ISCHEMICO TRANSITORIO E OCCLUSIONI PRECEREBRALI
016	1	M	MALATTIE CEREBROVASCOLARI ASPECIFICHE CON CC
017	1	M	MALATTIE CEREBROVASCOLARI ASPECIFICHE SENZA CC
018	1	M	MALATTIE DEI NERVI CRANICI E PERIFERICI CON CC
019	1	M	MALATTIE DEI NERVI CRANICI E PERIFERICI SENZA CC
020	1	M	INFEZIONI DEL SISTEMA NERVOSO ECCEPPO MENINGITE VIRALE
021	1	M	MENINGITE VIRALE
022	1	M	ENCEFALOPATIA IPERTENSIVA
023	1	M	STATO STUPOROSO E COMA DI ORIGINE NON TRAUMATICA
024	1	M	CONVULSIONI E CEFALEA ETA` > 17 CON CC
025	1	M	CONVULSIONI E CEFALEA ETA` > 17 SENZA CC
026	1	M	CONVULSIONI E CEFALEA ETA` < 18
027	1	M	STATO STUPOROSO E COMA DI ORIGINE TRAUMATICA, COMA > 1 ORA
028	1	M	STATO STUPOROSO E COMA DI ORIGINE TRAUMATICA, COMA < 1 ORA, ETA` > 17 CON CC
029	1	M	STATO STUPOROSO E COMA DI ORIGINE TRAUMATICA, COMA < 1 ORA, ETA` > 17 SENZA CC
030	1	M	STATO STUPOROSO E COMA DI ORIGINE TRAUMATICA, COMA < 1 ORA, ETA` < 18
031	1	M	COMMOZIONE CEREBRALE, ETA` > 17 CON CC
032	1	M	COMMOZIONE CEREBRALE, ETA` > 17 SENZA CC
033	1	M	COMMOZIONE CEREBRALE, ETA` < 18
034	1	M	ALTRE MALATTIE DEL SISTEMA NERVOSO, CON CC
035	1	M	ALTRE MALATTIE DEL SISTEMA NERVOSO, SENZA CC
036	2	C	INTERVENTI SULLA RETINA
037	2	C	INTERVENTI SULL'ORBITA
038	2	C	INTERVENTI PRIMARI SULL'IRIDE
039	2	C	INTERVENTI SUL CRISTALLINO CON O SENZA VITRECTOMIA
040	2	C	INTERVENTI SULLE STRUTTURE EXTRAOCULARI ECCEPPO L'ORBITA, ETA` > 17
041	2	C	INTERVENTI SULLE STRUTTURE EXTRAOCULARI ECCEPPO L'ORBITA, ETA` < 18
042	2	C	INTERVENTI SULLE STRUTTURE INTRAOCULARI ECCEPPO RETINA, IRIDE E CRISTALLINO
043	2	M	IFEMA
044	2	M	INFEZIONI ACUTE MAGGIORI DELL'OCCHIO
045	2	M	MALATTIE NEUROLOGICHE DELL'OCCHIO
046	2	M	ALTRE MALATTIE DELL'OCCHIO, ETA` > 17 CON CC
047	2	M	ALTRE MALATTIE DELL'OCCHIO, ETA` > 17 SENZA CC
048	2	M	ALTRE MALATTIE DELL'OCCHIO, ETA` < 18
049	3	C	INTERVENTI MAGGIORI SUL CAPO E SUL COLLO
050	3	C	SIALOADENECTOMIA
051	3	C	INTERVENTI SULLE GHIANDOLE SALIVARI ECCEPPO SIALOADENECTOMIA
052	3	C	RIPARAZIONE DI CHEILOSCISI E DI PALATOSCHISI
053	3	C	INTERVENTI SU SENI E MASTOIDE, ETA` > 17
054	3	C	INTERVENTI SU SENI E MASTOIDE, ETA` < 18
055	3	C	MISCELLANEA DI INTERVENTI SU ORECCHIO, NASO, BOCCA E GOLA

056	3	C	RINOPLASTICA
057	3	C	INTERVENTI SU TONSILLE E ADENOIDI ECCETTO SOLO TONSILLECTOMIA E/O ADENOIDEDEC ETA`>17
058	3	C	INTERVENTI SU TONSILLE E ADENOIDI ECCETTO SOLO TONSILLECTOMIA E/O ADENOIDECTIONIA ETA` <18
059	3	C	TONSILLECTOMIA E/O ADENOIDECTIONIA, ETA` > 17
060	3	C	TONSILLECTOMIA E/O ADENOIDECTIONIA, ETA` < 18
061	3	C	MIRINGOTOMIA CON INSERZIONE DI TUBO, ETA` > 17
062	3	C	MIRINGOTOMIA CON INSERZIONE DI TUBO, ETA` < 18
063	3	C	ALTRI INTERVENTI SU ORECCHIO, NASO, BOCCA E GOLA
064	3	M	NEOPLASIE MALIGNI DI ORECCHIO, NASO, BOCCA E GOLA
065	3	M	ALTERAZIONI DELL'EQUILIBRIO
066	3	M	EPISTASSI
067	3	M	EPIGLOTTIDITE
068	3	M	OTITE MEDIA E INFEZIONI ALTE VIE RESPIRATORIE, ETA` > 17 CON CC
069	3	M	OTITE MEDIA E INFEZIONI ALTE VIE RESPIRATORIE, ETA` > 17 SENZA CC
070	3	M	OTITE MEDIA E INFEZIONI ALTE VIE RESPIRATORIE, ETA` < 18
071	3	M	LARINGOTRACHEITE
072	3	M	TRAUMATISMI E DEFORMITA' DEL NASO
073	3	M	ALTRE DIAGNOSI RELATIVE A ORECCHIO, NASO, BOCCA E GOLA, ETA` > 17
074	3	M	ALTRE DIAGNOSI RELATIVE A ORECCHIO, NASO, BOCCA E GOLA, ETA` < 18
075	4	C	INTERVENTI MAGGIORI SUL TORACE
076	4	C	ALTRI INTERVENTI SULL'APPARATO RESPIRATORIO, CON CC
077	4	C	ALTRI INTERVENTI SULL'APPARATO RESPIRATORIO, SENZA CC
078	4	M	EMBOLIA POLMONARE
079	4	M	INFEZIONI E INFIAMMAZIONI RESPIRATORIE, ETA` > 17 CON CC
080	4	M	INFEZIONI E INFIAMMAZIONI RESPIRATORIE, ETA` > 17 SENZA CC
081	4	M	INFEZIONI E INFIAMMAZIONI RESPIRATORIE, ETA` < 18
082	4	M	NEOPLASIE DELL'APPARATO RESPIRATORIO
083	4	M	TRAUMI MAGGIORI DEL TORACE, CON CC
084	4	M	TRAUMI MAGGIORI DEL TORACE, SENZA CC
085	4	M	VERSAMENTO PLEURICO, CON CC
086	4	M	VERSAMENTO PLEURICO, SENZA CC
087	4	M	EDEMA POLMONARE E INSUFFICIENZA RESPIRATORIA
088	4	M	MALATTIA POLMONARE CRONICA OSTRUTTIVA
089	4	M	POLMONITE SEMPLICE E PLEURITE, ETA` > 17 CON CC
090	4	M	POLMONITE SEMPLICE E PLEURITE, ETA` > 17 SENZA CC
091	4	M	POLMONITE SEMPLICE E PLEURITE, ETA` < 18
092	4	M	MALATTIA POLMONARE INTERSTIZIALE, CON CC
093	4	M	MALATTIA POLMONARE INTERSTIZIALE, SENZA CC
094	4	M	PNEUMOTORACE, CON CC
095	4	M	PNEUMOTORACE, SENZA CC
096	4	M	BRONCHITE E ASMA, ETA` > 17 CON CC
097	4	M	BRONCHITE E ASMA, ETA` > 17 SENZA CC
098	4	M	BRONCHITE E ASMA, ETA` < 18
099	4	M	SEGNI E SINTOMI RESPIRATORI, CON CC
100	4	M	SEGNI E SINTOMI RESPIRATORI, SENZA CC
101	4	M	ALTRE DIAGNOSI RELATIVE ALL'APPARATO RESPIRATORIO, CON CC
102	4	M	ALTRE DIAGNOSI RELATIVE ALL'APPARATO RESPIRATORIO, SENZA CC
103	5	C	TRAPIANTO CARDIACO
104	5	C	INTERVENTI SULLE VALVOLE CARDIACHE CON CATETERISMO CARDIACO
105	5	C	INTERVENTI SULLE VALVOLE CARDIACHE SENZA CATETERISMO CARDIACO
106	5	C	BYPASS CORONARICO CON CATETERISMO CARDIACO
107	5	C	BYPASS CORONARICO SENZA CATETERISMO CARDIACO
108	5	C	ALTRI INTERVENTI SUL SISTEMA CARDIOVASCOLARE
110	5	C	INTERVENTI MAGGIORI SUL SISTEMA CARDIOVASCOLARE, CON CC
111	5	C	INTERVENTI MAGGIORI SUL SISTEMA CARDIOVASCOLARE, SENZA CC
112	5	C	INTERVENTI SUL SISTEMA CARDIOVASCOLARE PER VIA PERCUTANEA
113	5	C	AMPUTAZIONE PER DISTURBI CIRCOLATORI ECCETTO AMPUTAZIONE ARTO SUPERIORE E DITA PIEDE
114	5	C	AMPUTAZIONE ARTO SUPERIORE E DITA PIEDE PER MALATTIE APPARATO CIRCOLATORIO
115	5	C	IMPIANTO PACEMAKER CARDIACO PERMANENTE CON INFARTO MIOCARDICO ACUTO, INSUFFICIENZA CARDIACA O SHOCK

116	5	C	ALTRI INTERVENTI PER IMPIANTO DI PACEMAKER CARDIACO PERMANENTE O DI DEFIBRILLATORE AUTOMATICO (AICD) O DI GENERATORE DI IMPULSI
117	5	C	REVISIONE DEL PACEMAKER CARDIACO, ECCETTO SOSTITUZIONE
118	5	C	SOSTITUZIONE DI PACEMAKER CARDIACO
119	5	C	LEGATURA E STRIPPING DI VENE
120	5	C	ALTRI INTERVENTI SULL'APPARATO CIRCOLATORIO
121	5	M	MALATTIE CARDIOVASCOLARI CON INFARTO MIOCARDICO ACUTO E COMPLICANZE CARDIOVASCOLARI DIMESSI VIVI
122	5	M	MALATTIE CARDIOVASCOLARI CON INFARTO MIOCARDICO ACUTO SENZA COMPLICANZE CARDIOVASCOLARI DIMESSI VIVI
123	5	M	MALATTIE CARDIOVASCOLARI CON INFARTO MIOCARDICO ACUTO, MORTI
124	5	M	MALATTIE CARDIOVASCOLARI ECCETTO INFARTO MIOCARDICO ACUTO, CON CATETERISMO CARDIACO E DIAGNOSI COMPLICATA
125	5	M	MALATTIE CARDIOVASCOLARI ECCETTO INFARTO MIOCARDICO ACUTO, CON CATETERISMO CARDIACO E DIAGNOSI NON COMPLICATA
126	5	M	ENDOCARDITE ACUTA E SUBACUTA
127	5	M	INSUFFICIENZA CARDIACA E SHOCK
128	5	M	TROMBOFLEBITE DELLE VENE PROFONDE
129	5	M	ARRESTO CARDIACO SENZA CAUSA APPARENTE
130	5	M	MALATTIE VASCOLARI PERIFERICHE, CON CC
131	5	M	MALATTIE VASCOLARI PERIFERICHE, SENZA CC
132	5	M	ATEROSCLEROSI, CON CC
133	5	M	ATEROSCLEROSI, SENZA CC
134	5	M	IPERTENSIONE
135	5	M	MALATTIE CARDIACHE CONGENITE E VALVOLARI, ETA` > 17 CON CC
136	5	M	MALATTIE CARDIACHE CONGENITE E VALVOLARI, ETA` > 17 SENZA CC
137	5	M	MALATTIE CARDIACHE CONGENITE E VALVOLARI, ETA` < 18
138	5	M	ARITMIA E ALTERAZIONI DELLA CONDUZIONE CARDIACA, CON CC
139	5	M	ARITMIA E ALTERAZIONI DELLA CONDUZIONE CARDIACA, SENZA CC
140	5	M	ANGINA PECTORIS
141	5	M	SINCOPE E COLLASSO, CON CC
142	5	M	SINCOPE E COLLASSO, SENZA CC
143	5	M	DOLORE TORACICO
144	5	M	ALTRE DIAGNOSI RELATIVE ALL'APPARATO CIRCOLATORIO CON CC
145	5	M	ALTRE DIAGNOSI RELATIVE ALL'APPARATO CIRCOLATORIO SENZA CC
146	6	C	RESEZIONE RETTALE, CON CC
147	6	C	RESEZIONE RETTALE, SENZA CC
148	6	C	INTERVENTI MAGGIORI SU INTESTINO CRASSO E TENUE, CON CC
149	6	C	INTERVENTI MAGGIORI SU INTESTINO CRASSO E TENUE, SENZA CC
150	6	C	LISI DI ADERENZE PERITONEALI, CON CC
151	6	C	LISI DI ADERENZE PERITONEALI, SENZA CC
152	6	C	INTERVENTI MINORI SU INTESTINO CRASSO E TENUE, CON CC
153	6	C	INTERVENTI MINORI SU INTESTINO CRASSO E TENUE, SENZA CC
154	6	C	INTERVENTI SU ESOFAGO, STOMACO E DUODENO, ETA` > 17 CON CC
155	6	C	INTERVENTI SU ESOFAGO, STOMACO E DUODENO, ETA` > 17 SENZA CC
156	6	C	INTERVENTI SU ESOFAGO, STOMACO E DUODENO, ETA` < 18
157	6	C	INTERVENTI SU ANO E STOMA, CON CC
158	6	C	INTERVENTI SU ANO E STOMA, SENZA CC
159	6	C	INTERVENTI PER ERNIA, ECCETTO INGUINALE E FEMORALE, ETA` > 17 CON CC
160	6	C	INTERVENTI PER ERNIA, ECCETTO INGUINALE E FEMORALE, ETA` > 17 SENZA CC
161	6	C	INTERVENTI PER ERNIA INGUINALE E FEMORALE, ETA` > 17 CON CC
162	6	C	INTERVENTI PER ERNIA INGUINALE E FEMORALE, ETA` > 17 SENZA CC
163	6	C	INTERVENTI PER ERNIA, ETA` < 18
164	6	C	APPENDICECTOMIA CON DIAGNOSI PRINCIPALE COMPLICATA, CON CC
165	6	C	APPENDICECTOMIA CON DIAGNOSI PRINCIPALE COMPLICATA, SENZA CC
166	6	C	APPENDICECTOMIA CON DIAGNOSI PRINCIPALE NON COMPLICATA, CON CC
167	6	C	APPENDICECTOMIA CON DIAGNOSI PRINCIPALE NON COMPLICATA, SENZA CC
168	3	C	INTERVENTI SULLA BOCCA, CON CC
169	3	C	INTERVENTI SULLA BOCCA, SENZA CC
170	6	C	ALTRI INTERVENTI SULL'APPARATO DIGERENTE, CON CC
171	6	C	ALTRI INTERVENTI SULL'APPARATO DIGERENTE, SENZA CC
172	6	M	NEOPLASIE MALIGNHE DELL'APPARATO DIGERENTE, CON CC
173	6	M	NEOPLASIE MALIGNHE DELL'APPARATO DIGERENTE, SENZA CC

174	6	M	EMORRAGIA GASTROINTESTINALE, CON CC
175	6	M	EMORRAGIA GASTROINTESTINALE, SENZA CC
176	6	M	ULCERA PEPTICA COMPLICATA
177	6	M	ULCERA PEPTICA NON COMPLICATA, CON CC
178	6	M	ULCERA PEPTICA NON COMPLICATA, SENZA CC
179	6	M	MALATTIE INFIAMMATORIE DELL'INTESTINO
180	6	M	OCCLUSIONE GASTROINTESTINALE, CON CC
181	6	M	OCCLUSIONE GASTROINTESTINALE, SENZA CC
182	6	M	ESOFAGITE, GASTROENTERITE E MISCELLANEA DI MALATTIE DELL'APPARATO DIGERENTE, ETA`>17 CON CC
183	6	M	ESOFAGITE, GASTROENTERITE E MISCELLANEA DI MALATTIE DELL'APPARATO DIGERENTE, ETA` >17 SENZA CC
184	6	M	ESOFAGITE, GASTROENTERITE E MISCELLANEA DI MALATTIE DELL'APPARATO DIGERENTE, ETA` < 18
185	3	M	MALATTIE DEI DENTI E DEL CAVO ORALE, ECCETTO ESTRAZIONE E RIPARAZIONE, ETA` >17
186	3	M	MALATTIE DEI DENTI E DEL CAVO ORALE, ECCETTO ESTRAZIONE E RIPARAZIONE, ETA` < 18
187	3	M	ESTRAZIONI E RIPARAZIONI DENTALI
188	6	M	ALTRE DIAGNOSI RELATIVE ALL'APPARATO DIGERENTE, ETA` > 17 CON CC
189	6	M	ALTRE DIAGNOSI RELATIVE ALL'APPARATO DIGERENTE, ETA` > 17 SENZA CC
190	6	M	ALTRE DIAGNOSI RELATIVE ALL'APPARATO DIGERENTE, ETA` < 18
191	7	C	INTERVENTI SU PANCREAS, FEGATO E DI SHUNT CON CC
192	7	C	INTERVENTI SU PANCREAS, FEGATO E DI SHUNT SENZA CC
193	7	C	INTERVENTI SULLE VIE BILIARI ECCETTO COLECISTECTOMIA ISOLATA CON O SENZA ESPLORAZIONE DEL DOTTO BILIARE COMUNE CON CC
194	7	C	INTERVENTI SULLE VIE BILIARI, ECCETTO COLECISTECTOMIA ISOLATA CON O SENZA ESPLORAZIONE DEL DOTTO BILIARE COMUNE SENZA CC
195	7	C	COLECISTECTOMIA CON ESPLORAZIONE DEL DOTTO BILIARE COMUNE, CON CC
196	7	C	COLECISTECTOMIA CON ESPLORAZIONE DEL DOTTO BILIARE COMUNE, SENZA CC
197	7	C	COLECISTECTOMIA SENZA ESPLORAZIONE DEL DOTTO BILIARE COMUNE, CON CC
198	7	C	COLECISTECTOMIA SENZA ESPLORAZIONE DEL DOTTO BILIARE COMUNE, SENZA CC
199	7	C	PROCEDURE DIAGNOSTICHE EPATOBILIARI PER NEOPLASIE MALIGNI
200	7	C	PROCEDURE DIAGNOSTICHE EPATOBILIARI NON PER NEOPLASIE MALIGNI
201	7	C	ALTRI INTERVENTI EPATOBILIARI O SUL PANCREAS
202	7	M	CIRROSI E EPATITE ALCOOLICA
203	7	M	NEOPLASIE MALIGNI DELL'APPARATO EPATOBILIARE O DEL PANCREAS
204	7	M	MALATTIE DEL PANCREAS ECCETTO NEOPLASIE MALIGNI
205	7	M	MALATTIE DEL FEGATO ECCETTO NEOPLASIE MALIGNI, CIRROSI, EPATITE ALCOOLICA, CON CC
206	7	M	MALATTIE DEL FEGATO ECCETTO NEOPLASIE MALIGNI, CIRROSI, EPATITE ALCOOLICA, SENZA CC
207	7	M	MALATTIE DELLE VIE BILIARI, CON CC
208	7	M	MALATTIE DELLE VIE BILIARI, SENZA CC
209	8	C	INTERVENTI SU ARTICOLAZIONI MAGGIORI E REIMPIANTI DI ARTI INFERIORI
210	8	C	INTERVENTI SU ANCA E FEMORE, ECCETTO ARTICOLAZIONI MAGGIORI, ETA` >17 CON CC
211	8	C	INTERVENTI SU ANCA E FEMORE, ECCETTO ARTICOLAZIONI MAGGIORI, ETA` >17 SENZA CC
212	8	C	INTERVENTI SU ANCA E FEMORE ECCETTO ARTICOLAZIONI MAGGIORI, ETA` < 18
213	8	C	AMPUTAZIONI PER MALATTIE DEL SISTEMA MUSCOLOSCELETRICO E TESSUTO CONNETTIVO
214	8	C	INTERVENTI SU DORSO E COLLO, CON CC
215	8	C	INTERVENTI SU DORSO E COLLO, SENZA CC
216	8	C	BIOPSIE DEL SISTEMA MUSCOLOSCELETRICO E TESSUTO CONNETTIVO
217	8	C	SBRIGLIAMENTO FERITA E TRAPIANTO CUTANEO ECCETTO MANO, PER MALATTIE DEL SISTEMA MUSCOLOSCELETRICO E TESSUTO CONNETTIVO
218	8	C	INTERVENTI SU ARTO INFERIORE E Omero ECCETTO ANCA, PIEDE E FEMORE, ETA`>17 CON CC
219	8	C	INTERVENTI SU ARTO INFERIORE E Omero ECCETTO ANCA, PIEDE E FEMORE, ETA`>17 SENZA CC
220	8	C	INTERVENTI SU ARTO INFERIORE E Omero ECCETTO ANCA, PIEDE E FEMORE, ETA` < 18
221	8	C	INTERVENTI SUL GINOCCHIO CON CC
222	8	C	INTERVENTI SUL GINOCCHIO SENZA CC
223	8	C	INTERVENTI MAGGIORI SU SPALLA E GOMITO O ALTRI INTERVENTI SU ARTO SUPERIORE CON CC
224	8	C	INTERVENTI SU SPALLA, GOMITO O AVAMBRACCIO ECCETTO INTERVENTI MAGGIORI SU ARTICOLAZIONI SENZA CC
225	8	C	INTERVENTI SUL PIEDE
226	8	C	INTERVENTI SUI TESSUTI MOLLI CON CC
227	8	C	INTERVENTI SUI TESSUTI MOLLI SENZA CC

228	8	C	INTERVENTI MAGGIORI SUL POLLICE O SULLE ARTICOLAZIONI O ALTRI INTERVENTI MANO O POLSO CON CC
229	8	C	INTERVENTI SU MANO O POLSO ECCETTO INTERVENTI MAGGIORI SULLE ARTICOLAZIONI, SENZA CC
230	8	C	ESCISSIONE LOCALE E RIMOZIONE DI MEZZI DI FISSAGGIO INTRAMIDOLLARE DI ANCA E FEMORE
231	8	C	ESCISSIONE LOCALE E RIMOZIONE DI MEZZI DI FISSAGGIO INTRAMIDOLLARE ECCETTO ANCA E FEMORE
232	8	C	ARTROSCOPIA
233	8	C	ALTRI INTERVENTI SU SISTEMA MUSCOLO-SCHELETRICO E TESSUTO CONNETTIVO CON CC
234	8	C	ALTRI INTERVENTI SU SISTEMA MUSCOLO-SCHELETRICO E TESSUTO CONNETTIVO SENZA CC
235	8	M	FRATTURE DEL FEMORE
236	8	M	FRATTURE DELL'ANCA E DELLA PELVI
237	8	M	DISTORSIONI, STIRAMENTI E LUSSAZIONI DI ANCA, PELVI E COSCIA
238	8	M	OSTEOMIELITE
239	8	M	FRATTURE PATOLOGICHE E NEOPLASIE MALIGNI DEL SISTEMA MUSCOLO-SCHELETRICO E TESSUTO CONNETTIVO
240	8	M	MALATTIE DEL TESSUTO CONNETTIVO, CON CC
241	8	M	MALATTIE DEL TESSUTO CONNETTIVO, SENZA CC
242	8	M	ARTRITE SETTICA
243	8	M	AFFEZIONI MEDICHE DEL DORSO
244	8	M	MALATTIE DELL'OSSO E ARTROPATIE SPECIFICHE, CON CC
245	8	M	MALATTIE DELL'OSSO E ARTROPATIE SPECIFICHE, SENZA CC
246	8	M	ARTROPATIE NON SPECIFICHE
247	8	M	SEGNI E SINTOMI RELATIVI AL SISTEMA MUSCOLO-SCHELETRICO E AL TESSUTO CONNETTIVO
248	8	M	TENDINITE, MIOSITE E BORSITE
249	8	M	ASSISTENZA RIABILITATIVA PER MALATTIE DEL SISTEMA MUSCOLO-SCHELETRICO E DEL TESSUTO CONNETTIVO
250	8	M	FRATTURE, DISTORSIONI, STIRAMENTI E LUSSAZIONI DI AVAMBRACCIO, MANO E PIEDE, ETA` >17 CON CC
251	8	M	FRATTURE, DISTORSIONI, STIRAMENTI E LUSSAZIONI DI AVAMBRACCIO, MANO E PIEDE, ETA` >17 SENZA CC
252	8	M	FRATTURE, DISTORSIONI, STIRAMENTI E LUSSAZIONI DI AVAMBRACCIO, MANO E PIEDE, ETA` <18
253	8	M	FRATTURE, DISTORSIONI, STIRAMENTI E LUSSAZIONI DI BRACCIO, GAMBA, ECCETTO PIEDE, ETA` >17 CON CC
254	8	M	FRATTURE, DISTORSIONI, STIRAMENTI E LUSSAZIONI DI BRACCIO, GAMBA, ECCETTO PIEDE, ETA` >17 SENZA CC
255	8	M	FRATTURE, DISTORSIONI, STIRAMENTI E LUSSAZIONI DI BRACCIO, GAMBA, ECCETTO PIEDE, ETA` < 18
256	8	M	ALTRE DIAGNOSI DEL SISTEMA MUSCOLO-SCHELETRICO E DEL TESSUTO CONNETTIVO
257	9	C	MASTECTOMIA TOTALE PER NEOPLASIE MALIGNI, CON CC
258	9	C	MASTECTOMIA TOTALE PER NEOPLASIE MALIGNI, SENZA CC
259	9	C	MASTECTOMIA SUBTOTALE PER NEOPLASIE MALIGNI, CON CC
260	9	C	MASTECTOMIA SUBTOTALE PER NEOPLASIE MALIGNI, SENZA CC
261	9	C	INTERVENTI SULLA MAMMELLA NON PER NEOPLASIE MALIGNI ECCETTO BIOPSIA E ESCISSIONE LOCALE
262	9	C	BIOPSIA DELLA MAMMELLA E ESCISSIONE LOCALE NON PER NEOPLASIE MALIGNI
263	9	C	TRAPIANTI DI PELLE E/O SBRIGLIAMENTI PER ULCERE DELLA PELLE O CELLULITE CON CC
264	9	C	TRAPIANTI DI PELLE E/O SBRIGLIAMENTI PER ULCERE PELLE O CELLULITE SENZA CC
265	9	C	TRAPIANTI DI PELLE E/O SBRIGLIAMENTI ECCETTO PER ULCERE DELLA PELLE/CELLULITE CON CC
266	9	C	TRAPIANTI DI PELLE E/O SBRIGLIAMENTI ECCETTO PER ULCERE DELLA PELLE/CELLULITE SENZA CC
267	9	C	INTERVENTI PERIANALI E PILONIDALI
268	9	C	CHIRURGIA PLASTICA DELLA PELLE, DEL TESSUTO SOTTOCUTANEO E DELLA MAMMELLA
269	9	C	ALTRI INTERVENTI SU PELLE, TESSUTO SOTTOCUTANEO E MAMMELLA CON CC
270	9	C	ALTRI INTERVENTI SU PELLE, TESSUTO SOTTOCUTANEO E MAMMELLA SENZA CC
271	9	M	ULCERE DELLA PELLE
272	9	M	MALATTIE MAGGIORI DELLA PELLE CON CC
273	9	M	MALATTIE MAGGIORI DELLA PELLE SENZA CC
274	9	M	NEOPLASIE MALIGNI DELLA MAMMELLA CON CC
275	9	M	NEOPLASIE MALIGNI DELLA MAMMELLA SENZA CC
276	9	M	PATOLOGIE NON MALIGNI DELLA MAMMELLA
277	9	M	CELLULITE ETA` > 17 CON CC



278	9	M	CELLULITE ETA` > 17 SENZA CC
279	9	M	CELLULITE ETA` < 18
280	9	M	TRAUMI DELLA PELLE, DEL TESSUTO SOTTOCUTANEO E DELLA MAMMELLA, ETA`>17 CON CC
281	9	M	TRAUMI DELLA PELLE, DEL TESSUTO SUBCUTANEO E DELLA MAMMELLA, ETA`>17 SENZA CC
282	9	M	TRAUMI DELLA PELLE, DEL TESSUTO SOTTOCUTANEO E DELLA MAMMELLA, ETA`<18
283	9	M	MALATTIE MINORI DELLA PELLE CON CC
284	9	M	MALATTIE MINORI DELLA PELLE SENZA CC
285	10	C	AMPUTAZIONI DI ARTO INFERIORE PER MALATTIE ENDOCRINE, NUTRIZIONALI O METABOLICHE
286	10	C	INTERVENTI SUL SURRENE E SULLA IPOFISI
287	10	C	TRAPIANTI CUTANEI E SBRIGLIAMENTO DI FERITE PER MALATTIE ENDOCRINE, NUTRIZIONALI E METABOLICHE
288	10	C	INTERVENTI PER OBESITA`
289	10	C	INTERVENTI SULLE PARATIROIDI
290	10	C	INTERVENTI SULLA TIROIDE
291	10	C	INTERVENTI SUL DOTTO TIREOGLOSSO
292	10	C	ALTRI INTERVENTI PER MALATTIE ENDOCRINE, NUTRIZIONALI E METABOLICHE CON CC
293	10	C	ALTRI INTERVENTI PER MALATTIE ENDOCRINE, NUTRIZIONALI E METABOLICHE SENZA CC
294	10	M	DIABETE ETA` > 35
295	10	M	DIABETE ETA` < 36
296	10	M	DISTURBI DELLA NUTRIZIONE E MISCELLANEA DI DISTURBI DEL METABOLISMO, ETA` > 17 CON CC
297	10	M	DISTURBI DELLA NUTRIZIONE E MISCELLANEA DI DISTURBI DEL METABOLISMO, ETA` > 17 SENZA CC
298	10	M	DISTURBI DELLA NUTRIZIONE E MISCELLANEA DI DISTURBI DEL METABOLISMO, ETA` < 18
299	10	M	DIFETTI CONGENITI DEL METABOLISMO
300	10	M	MALATTIE ENDOCRINE, CON CC
301	10	M	MALATTIE ENDOCRINE, SENZA CC
302	11	C	TRAPIANTO RENALE
303	11	C	INTERVENTI SU RENE E URETERE E INTERVENTI MAGGIORI SU VESCICA, PER NEOPLASIA
304	11	C	INTERVENTI SU RENE E URETERE E INTERVENTI MAGGIORI SU VESCICA, NON PER NEOPLASIA MALIGNA CON CC
305	11	C	INTERVENTI SU RENE E URETERE E INTERVENTI MAGGIORI SU VESCICA, NON PER NEOPLASIA, SENZA CC
306	11	C	PROSTATECTOMIA, CON CC
307	11	C	PROSTATECTOMIA, SENZA CC
308	11	C	INTERVENTI MINORI SULLA VESCICA, CON CC
309	11	C	INTERVENTI MINORI SULLA VESCICA, SENZA CC
310	11	C	INTERVENTI PER VIA TRANSURETRALE, CON CC
311	11	C	INTERVENTI PER VIA TRANSURETRALE, SENZA CC
312	11	C	INTERVENTI SULL'URETRA, ETA` > 17 CON CC
313	11	C	INTERVENTI SULL'URETRA, ETA` > 17 SENZA CC
314	11	C	INTERVENTI SULL'URETRA, ETA` < 18
315	11	C	ALTRI INTERVENTI SUL RENE E SULLE VIE URINARIE
316	11	M	INSUFFICIENZA RENALE
317	11	M	RICOVERO PER DIALISI RENALE
318	11	M	NEOPLASIE DEL RENE E DELLE VIE URINARIE CON CC
319	11	M	NEOPLASIE DEL RENE E DELLE VIE URINARIE SENZA CC
320	11	M	INFEZIONI DEL RENE E DELLE VIE URINARIE, ETA` > 17 CON CC
321	11	M	INFEZIONI DEL RENE E DELLE VIE URINARIE, ETA` > 17 SENZA CC
322	11	M	INFEZIONI DEL RENE E DELLE VIE URINARIE, ETA` < 18
323	11	M	CALCOLOSI URINARIA, CON CC E/O LITOTRIPSIA MEDIANTE ULTRASUONI
324	11	M	CALCOLOSI URINARIA, SENZA CC
325	11	M	SEGNI E SINTOMI RELATIVI A RENE E VIE URINARIE, ETA` > 17 CON CC
326	11	M	SEGNI E SINTOMI RELATIVI A RENE E VIE URINARIE, ETA` > 17 SENZA CC
327	11	M	SEGNI E SINTOMI RELATIVI A RENE E VIE URINARIE, ETA` < 18
328	11	M	STENOSI URETRALE, ETA` > 17 CON CC
329	11	M	STENOSI URETRALE, ETA` > 17 SENZA CC
330	11	M	STENOSI URETRALE, ETA` < 18
331	11	M	ALTRE DIAGNOSI RELATIVE A RENE E VIE URINARIE, ETA` > 17 CON CC
332	11	M	ALTRE DIAGNOSI RELATIVE A RENE E VIE URINARIE, ETA` > 17 SENZA CC
333	11	M	ALTRE DIAGNOSI RELATIVE A RENE E VIE URINARIE, ETA` < 18
334	12	C	INTERVENTI MAGGIORI SULLA PELVI MASCHILE CON CC
335	12	C	INTERVENTI MAGGIORI SULLA PELVI MASCHILE SENZA CC
336	12	C	PROSTATECTOMIA TRANSURETRALE, CON CC

337	12	C	PROSTATECTOMIA TRANSURETRALE SENZA CC
338	12	C	INTERVENTI SUL TESTICOLO PER NEOPLASIA MALIGNA
339	12	C	INTERVENTI SUL TESTICOLO NON PER NEOPLASIE MALIGNI, ETA` > 17
340	12	C	INTERVENTI SUL TESTICOLO NON PER NEOPLASIE MALIGNI, ETA` < 18
341	12	C	INTERVENTI SUL PENE
342	12	C	CIRCONCISIONE ETA` > 17
343	12	C	CIRCONCISIONE ETA` < 18
344	12	C	ALTRI INTERVENTI SULL'APPARATO RIPRODUTTIVO MASCHILE PER NEOPLASIE MALIGNI
345	12	C	ALTRI INTERVENTI SULL'APPARATO RIPRODUTTIVO MASCHILE ECCEPPO PER NEOPLASIE MALIGNI
346	12	M	NEOPLASIE MALIGNI DELL'APPARATO GENITALE MASCHILE, CON CC
347	12	M	NEOPLASIE MALIGNI DELL'APPARATO GENITALE MASCHILE, SENZA CC
348	12	M	IPERTROFIA PROSTATICA BENIGNA, CON CC
349	12	M	IPERTROFIA PROSTATICA BENIGNA, SENZA CC
350	12	M	INFIAMMAZIONI DELL'APPARATO RIPRODUTTIVO MASCHILE
352	12	M	ALTRE DIAGNOSI RELATIVE ALL'APPARATO RIPRODUTTIVO MASCHILE
353	13	C	EVISCERAZIONE PELVICA, ISTERECTOMIA RADICALE E VULVECTOMIA RADICALE
354	13	C	INTERVENTI SU UTERO E SU ANNESSI PER NEOPLASIE MALIGNI NON DELL'OVAIO O DEGLI ANNESSI CON CC
355	13	C	INTERVENTI SU UTERO E SU ANNESSI PER NEOPLASIE MALIGNI NON DELL'OVAIO O DEGLI ANNESSI SENZA CC
356	13	C	INTERVENTI RICOSTRUTTIVI DELL'APPARATO RIPRODUTTIVO FEMMINILE
357	13	C	INTERVENTI SU UTERO E ANNESSI PER NEOPLASIE MALIGNI DELL'OVAIO O DEGLI ANNESSI
358	13	C	INTERVENTI SU UTERO E ANNESSI NON PER NEOPLASIE MALIGNI, CON CC
359	13	C	INTERVENTI SU UTERO E ANNESSI NON PER NEOPLASIE MALIGNI, SENZA CC
360	13	C	INTERVENTI SU VAGINA, CERVICE E VULVA
361	13	C	LAPAROSCOPIA E OCCLUSIONE LAPAROTOMICA DELLE TUBE
362	13	C	OCCLUSIONE ENDOSCOPICA DELLE TUBE
363	13	C	DILATAZIONE E RASCHIAMENTO, CONIZZAZIONE E IMPIANTO MATERIALE RADIOATTIVO PER NEOPLASIE MALIGNI
364	13	C	DILATAZIONE E RASCHIAMENTO, CONIZZAZIONE ECCEPPO PER NEOPLASIE MALIGNI
365	13	C	ALTRI INTERVENTI SULL'APPARATO RIPRODUTTIVO FEMMINILE
366	13	M	NEOPLASIE MALIGNI DELL'APPARATO RIPRODUTTIVO FEMMINILE, CON CC
367	13	M	NEOPLASIE MALIGNI DELL'APPARATO RIPRODUTTIVO FEMMINILE, SENZA CC
368	13	M	INFEZIONI DELL'APPARATO RIPRODUTTIVO FEMMINILE
369	13	M	DISTURBI MESTRUALI E ALTRI DISTURBI DELL'APPARATO RIPRODUTTIVO FEMMINILE
370	14	C	PARTO CESAREO CON CC
371	14	C	PARTO CESAREO SENZA CC
372	14	M	PARTO VAGINALE CON DIAGNOSI COMPLICANTI
373	14	M	PARTO VAGINALE SENZA DIAGNOSI COMPLICANTI
374	14	C	PARTO VAGINALE CON STERILIZZAZIONE E/O DILATAZIONE E RASCHIAMENTO
375	14	C	PARTO VAGINALE CON ALTRO INTERVENTO ECCEPPO STERILIZZAZIONE E/O DILATAZIONE E RASCHIAMENTO
376	14	M	DIAGNOSI RELATIVE A POSTPARTO E POSTABORTO SENZA INTERVENTO CHIRURGICO
377	14	C	DIAGNOSI RELATIVE A POSTPARTO E POSTABORTO CON INTERVENTO CHIRURGICO
378	14	M	GRAVIDANZA ECTOPICA
379	14	M	MINACCIA DI ABORTO
380	14	M	ABORTO SENZA DILATAZIONE E RASCHIAMENTO
381	14	C	ABORTO CON DILATAZIONE E RASCHIAMENTO, MEDIANTE ASPIRAZIONE O ISTEROTOMIA
382	14	M	FALSO TRAVAGLIO
383	14	M	ALTRE DIAGNOSI PREPARTO CON COMPLICAZIONI MEDICHE
384	14	M	ALTRE DIAGNOSI PREPARTO SENZA COMPLICAZIONI MEDICHE
385	15		NEONATI MORTI O TRASFERITI AD ALTRE STRUTTURE DI ASSISTENZA PER ACUTI
386	15		NEONATI GRAVEMENTE IMMaturi O CON SINDROME DA DISTRESS RESPIRATORIO
387	15		PREMATURITA` CON AFFEZIONI MAGGIORI
388	15		PREMATURITA` SENZA AFFEZIONI MAGGIORI
389	15		NEONATI A TERMINE CON AFFEZIONI MAGGIORI
390	15		NEONATI CON ALTRE AFFEZIONI SIGNIFICATIVE
391	15		NEONATO NORMALE
392	16	C	SPLENECTOMIA, ETA` > 17
393	16	C	SPLENECTOMIA, ETA` < 18
394	16	C	ALTRI INTERVENTI SUGLI ORGANI EMOPOIETICI
395	16	M	ANOMALIE DEI GLOBULI ROSSI, ETA` > 17
396	16	M	ANOMALIE DEI GLOBULI ROSSI, ETA` < 18

397	16	M	DISTURBI DELLA COAGULAZIONE
398	16	M	DISTURBI DEL SISTEMA RETICOLOENDOTELIALE E IMMUNITARIO CON CC
399	16	M	DISTURBI DEL SISTEMA RETICOLOENDOTELIALE E IMMUNITARIO SENZA CC
400	17	C	LINFOMA E LEUCEMIA CON INTERVENTI CHIRURGICI MAGGIORI
401	17	C	LINFOMA E LEUCEMIA NON ACUTA CON ALTRI INTERVENTI CHIRURGICI CON CC
402	17	C	LINFOMA E LEUCEMIA NON ACUTA CON ALTRI INTERVENTI CHIRURGICI SENZA CC
403	17	M	LINFOMA E LEUCEMIA NON ACUTA CON CC
404	17	M	LINFOMA E LEUCEMIA NON ACUTA SENZA CC
405	17	M	LEUCEMIA ACUTA SENZA INTERVENTI CHIRURGICI MAGGIORI, ETA` < 18
406	17	C	ALTERAZIONI MIELOPROLIFERATIVE O NEOPLASIE POCO DIFFERENZIATE CON INTERVENTI MAGGIORI CON CC
407	17	C	ALTERAZIONI MIELOPROLIFERATIVE O NEOPLASIE POCO DIFFERENZIATE CON INTERVENTI MAGGIORI SENZA CC
408	17	C	ALTERAZIONI MIELOPROLIFERATIVE O NEOPLASIE POCO DIFFERENZIATE CON ALTRI INTERVENTI
409	17	M	RADIOTERAPIA
410	17	M	CHEMIOTERAPIA NON ASSOCIATA A DIAGNOSI SECONDARIA DI LEUCEMIA ACUTA
411	17	M	ANAMNESI DI NEOPLASIA MALIGNA SENZA ENDOSCOPIA
412	17	M	ANAMNESI DI NEOPLASIA MALIGNA CON ENDOSCOPIA
413	17	M	ALTRE ALTERAZIONI MIELOPROLIFERATIVE E NEOPLASIE POCO DIFFERENZIATE, CON CC
414	17	M	ALTRE ALTERAZIONI MIELOPROLIFERATIVE E NEOPLASIE POCO DIFFERENZIATE, SENZA CC
415	18	C	INTERVENTI CHIRURGICI PER MALATTIE INFETTIVE E PARASSITARIE
416	18	M	SETTICEMIA, ETA` > 17
417	18	M	SETTICEMIA, ETA` < 18
418	18	M	INFEZIONI POST-CHIRURGICHE E POST-TRAUMATICHE
419	18	M	FEBBRE DI ORIGINE SCONOSCIUTA, ETA` > 17 CON CC
420	18	M	FEBBRE DI ORIGINE SCONOSCIUTA, ETA` > 17 SENZA CC
421	18	M	MALATTIE DI ORIGINE VIRALE, ETA` > 17
422	18	M	MALATTIE DI ORIGINE VIRALE E FEBBRE DI ORIGINE SCONOSCIUTA, ETA` < 18
423	18	M	ALTRE DIAGNOSI RELATIVE A MALATTIE INFETTIVE E PARASSITARIE
424	19	C	INTERVENTI CHIRURGICI DI QUALUNQUE TIPO IN PAZIENTI CON DIAGNOSI PRINCIPALE DI MALATTIA MENTALE
425	19	M	REAZIONE ACUTA DI ADATTAMENTO E DISFUNZIONE PSICOSOCIALE
426	19	M	NEVROSI DEPRESSIVE
427	19	M	NEVROSI ECCETTO NEVROSI DEPRESSIVE
428	19	M	DISTURBI DELLA PERSONALITA` E DEL CONTROLLO DEGLI IMPULSI
429	19	M	DISTURBI ORGANICI E RITARDO MENTALE
430	19	M	PSICOSI
431	19	M	DISTURBI MENTALI DELL'INFANZIA
432	19	M	ALTRE DIAGNOSI RELATIVE A DISTURBI MENTALI
433	20		ABUSO O DIPENDENZA DA ALCOOL/FARMACI; DIMESSO CONTRO IL PARERE DEI SANITARI
434	20		ABUSO O DIPENDENZA DA ALCOOL/FARMACI, DISINTOSSICAZIONE O ALTRO TRATTAMENTO SINTOMATICO CON CC
435	20		ABUSO O DIPENDENZA DA ALCOOL/FARMACI, DISINTOSSICAZIONE O ALTRO TRATTAMENTO SINTOMATICO SENZA CC
436	20		DIPENDENZA DA ALCOOL/FARMACI CON TERAPIA RIABILITATIVA
437	20		DIPENDENZA DA ALCOOL/FARMACI, TERAPIA RIABILITATIVA E DISINTOSSICANTE COMBinate
439	21	C	TRAPIANTI DI PELLE PER TRAUMATISMO
440	21	C	SBRIGLIAMENTO DI FERITE PER TRAUMATISMO
441	21	C	INTERVENTI SULLA MANO PER TRAUMATISMO
442	21	C	ALTRI INTERVENTI CHIRURGICI PER TRAUMATISMO, CON CC
443	21	C	ALTRI INTERVENTI CHIRURGICI PER TRAUMATISMO, SENZA CC
444	21	M	TRAUMATISMI, ETA` > 17, CON CC
445	21	M	TRAUMATISMI, ETA` > 17, SENZA CC
446	21	M	TRAUMATISMI, ETA` < 18
447	21	M	REAZIONI ALLERGICHE, ETA` > 17
448	21	M	REAZIONI ALLERGICHE, ETA` < 18
449	21	M	AVVELENAMENTI ED EFFETTI TOSSICI DEI FARMACI, ETA` > 17 CON CC
450	21	M	AVVELENAMENTI ED EFFETTI TOSSICI DEI FARMACI, ETA` > 17 SENZA CC
451	21	M	AVVELENAMENTI ED EFFETTI TOSSICI DEI FARMACI, ETA` < 18
452	21	M	COMPLICAZIONI DI TRATTAMENTI, CON CC
453	21	M	COMPLICAZIONI DI TRATTAMENTI, SENZA CC
454	21	M	ALTRE DIAGNOSI DI TRAUMATISMI, AVVELENAMENTI ED EFFETTI TOSSICI, CON CC

455	21	M	ALTRE DIAGNOSI DI TRAUMATISMI, AVVELENAMENTI ED EFFETTI TOSSICI, SENZA CC
456	22	M	USTIONI, PAZIENTE TRASFERITO AD ALTRA STRUTTURA DI ASSISTENZA PER ACUTI
457	22	M	USTIONI ESTESE SENZA INTERVENTO CHIRURGICO
458	22	C	USTIONI NON ESTESE CON TRAPIANTO DI PELLE
459	22	C	USTIONI NON ESTESE CON SBRIGLIAMENTO DI FERITE E ALTRO INTERVENTO CHIRURGICO
460	22	M	USTIONI NON ESTESE SENZA INTERVENTO CHIRURGICO
461	23	C	INTERVENTO CON DIAGNOSI DI ALTRO CONTATTO CON I SERVIZI SANITARI
462	23	M	RIABILITAZIONE
463	23	M	SEGNI E SINTOMI CON CC
464	23	M	SEGNI E SINTOMI SENZA CC
465	23	M	ASSISTENZA RIABILITATIVA CON ANAMNESI DI NEOPLASIA MALIGNA COME DIAGNOSI SECONDARIA
466	23	M	ASSISTENZA RIABILITATIVA SENZA ANAMNESI DI NEOPLASIA MALIGNA COME DIAGNOSI SECONDARIA
467	23	M	ALTRI FATTORI CHE INFLUENZANO LO STATO DI SALUTE
468		C	INTERVENTO CHIRURGICO ESTESO NON CORRELATO CON LA DIAGNOSI PRINCIPALE
469			DIAGNOSI PRINCIPALE NON VALIDA COME DIAGNOSI DI DIMISSIONE
470			NON ATTRIBUIBILE AD ALTRO DRG
471	8	C	INTERVENTI MAGGIORI BILATERALI O MULTIPLI SULLE ARTICOLAZIONI DEGLI ARTI INFERIORI
472	22	C	USTIONI ESTESE CON INTERVENTO CHIRURGICO
473	17	M	LEUCEMIA ACUTA SENZA INTERVENTI CHIRURGICI MAGGIORI, ETA' > 17
475	4	M	DIAGNOSI RELATIVE ALL'APPARATO RESPIRATORIO CON RESPIRAZIONE ASSISTITA
476		C	INTERVENTO CHIRURGICO SULLA PROSTATA NON CORRELATO CON LA DIAGNOSI PRINCIPALE
477		C	INTERVENTO CHIRURGICO NON ESTESO NON CORRELATO CON LA DIAGNOSI PRINCIPALE
478	5	C	ALTRI INTERVENTI SUL SISTEMA CARDIOVASCOLARE, CON CC
479	5	C	ALTRI INTERVENTI SUL SISTEMA CARDIOVASCOLARE, SENZA CC
480		C	TRAPIANTO DI FEGATO
481		C	TRAPIANTO DI MIDOLLO OSSEO
482		C	TRACHEOSTOMIA PER DISTURBI ORALI, LARINGEI O FARINGEI
483		C	TRACHEOSTOMIA ECCETTO PER DISTURBI ORALI, LARINGEI O FARINGEI
484	24	C	CRANIOTOMIA PER TRAUMATISMI MULTIPLI RILEVANTI
485	24	C	REIMPIANTO DI ARTI, INTERVENTI SU ANCA E FEMORE PER TRAUMATISMI MULTIPLI RILEVANTI
486	24	C	ALTRI INTERVENTI CHIRURGICI PER TRAUMATISMI MULTIPLI RILEVANTI
487	24	M	ALTRI TRAUMATISMI MULTIPLI RILEVANTI
488	25	C	H.I.V. ASSOCIATO AD INTERVENTO CHIRURGICO ESTESO
489	25	M	H.I.V. ASSOCIATO AD ALTRE PATOLOGIE MAGGIORI CORRELATE
490	25	M	H.I.V. ASSOCIATO O NON AD ALTRE PATOLOGIE CORRELATE
491	8	C	INTERVENTI SU ARTICOLAZIONI MAGGIORI E REIMPIANTI DI ARTI SUPERIORI
492	17	M	CHEMIOTERAPIA ASSOCIATA A DIAGNOSI SECONDARIA DI LEUCEMIA ACUTA

## ANNEX 2

### Faculty and group of homogenous faculties

<b>FACULTY</b>	<b>Group</b>
1 Environmental Sciences Natural, Physical and Mathematical Sciences Biotechnology Science and Technology	<b>Sciences</b>
2 Pharmacy	<b>Pharmacy</b>
3 Medicine and Surgery	<b>Medicine and Surgery</b>
4 Engineering Aerospace engineering Industrial Chemistry	<b>Engineering</b>
5 Architecture Arts and Design	<b>Architecture</b>
6 Agriculture	<b>Agriculture</b>
7 Veterinary Medicine	<b>Veterinary Medicine</b>
8 Sociology	<b>Sociology</b>
9 Political science	<b>Political science</b>
10 Law	<b>Law</b>
11 Letters and Philosophy Communication Sciences Library and Archive Studies Philosophy Musicology Humanities	<b>Letter</b>
12 Language and Foreign Literatures Language and Foreign Modern Literatures Italian Language and Culture Modern language for Interpreters and Translators Modern language Islamic studies Oriental Studies	<b>Language</b>
13 Cultural Heritage Preservation of the Cultural Heritage	<b>Cultural Heritage</b>
14 Psychology Social Sciences	<b>Psychology</b>
15 Economics Banking, Finance and Insurance	<b>Economics</b>
16 Educational Sciences Humanities and Social Sciences	<b>Education</b>
17 Statistics	<b>Statistics</b>
18 Exercise and Sport Science	<b>Exercise and Sport Science</b>

## ANNEX 3

### Description of General Government Bodies

Bodies (35)	Description of Bodies (35)	Bodies (14)	Description of Bodies (14)
MINISTERI	Ministeries	Stato	State
COSTITUZ	Constitutional Bodies	Stato	State
SCUOLA	Bodies of Education sector	Stato	State
SICNAZ	National Security (police,...)	Stato	State
DIFNAZ	Defence	Stato	State
LEVA	Military National Service (conscription)	Stato	State
EEN	Economic Services Producers	EEN	Economic Services Producers
ALTRI ENA	Other Institutions Providing Cultural Services and Assistance at the Central Level	ENA	Institutions Providing Cultural Services and Assistance at the Central Level
ENA	Institutions Providing Cultural Services and Assistance at the Central Level	ENA	Institutions Providing Cultural Services and Assistance at the Central Level
EDR	Research Bodies	EDR	Research Bodies
SPERIM EDR	Experimental Research Bodies	EDR	Research Bodies
ZOOPROF EDR	Other Research Bodies	EDR	Research Bodies
OSSERV EDR	Other Research Bodies	EDR	Research Bodies
REGIONI	Regions and Autonomous Provinces	Regioni	Regions and Autonomous Provinces
PROVINCE	Provinces	Province	Provinces
COMUNI	Municipalities	Comuni	Municipalities
ASL	Local Health Units	ASL	Local Health Units
AZOSP	Hospital Bodies	ASL	Local Health Units
IRCCS	Research and Care Institutes for Health	IRCCS	Research and Care Institutes for Health
CAMCOM EEL	Chambers of Commerce	CAMCOM	Chambers of Commerce
APT EEL	Tourism Bodies	ALTRI EEL	Other Economic Bodies at local Level
AUTPORT EEL	Harbours Bodies	ALTRI EEL	Other Economic Bodies at local Level
COMONT EEL	Mountains Development Bodies	COMONT	Mountains Development Bodies
UNCOM EEL	Union of Municipalities	ALTRI EEL	Other Economic Bodies at local Level
EDS EEL	Regional Development Bodies	ALTRI EEL	Other Economic Bodies at local Level
AGLAV EEL	Job Agencies at local level	ALTRI EEL	Other Economic Bodies at local Level
AGSAN EEL	Health Agencies at local level	ALTRI EEL	Other Economic Bodies at local Level
ALTRI EEL	Other Economic Bodies at local Level	ALTRI EEL	Other Economic Bodies at local Level
UNIV EAL	Universities	EAL	Institutions Providing Education, Cultural Services and Assistance at the Local Level
LIRIC EAL	Concert and similar Bodies	EAL	Institutions Providing Education, Cultural Services and Assistance at the Local Level
PARC EAL	Park Bodies	EAL	Institutions Providing Education, Cultural Services and Assistance at the Local Level
ADISU EAL	Bodies for the Right to University Education	EAL	Institutions Providing Education, Cultural Services and Assistance at the Local Level
ARPA EAL	Regional Bodies for Research and Environment	EAL	Institutions Providing Education, Cultural Services and Assistance at the Local Level
AIRRSAE EAL	Regional for Research in Education	EAL	Institutions Providing Education, Cultural Services and Assistance at the Local Level
EDP	Social Security Funds	EDP	Social Security Funds

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