

Taroni, 2005). The sample includes two types of hospitals: those directly managed by the LHU (ASL from now on), and other major hospitals that have been hived off from the LHU and transformed into independent enterprises called *Aziende Ospedaliere* (AO from now on).

This unique dataset includes all the publicly owned firms involved in the provision of hospital services in the Piedmont Region. The time span covered by the data follows the different reforms of the National Health Service (NHS), so that our units are affected by the policy of downsizing of the industry which has been pursued during the 90s, and which is still regarded as one of the primary areas of intervention to control health expenditure. Planning at the regional level of health care provisions (as envisaged in the recent Piedmont Socio-Health Plan for the years 2006-2010) foresees a reorganisation of the regional hospital network, with the aim of increasing the quality and the effectiveness of services. This would imply a reduction of the required number of beds, due to the planned reduction of average length of stay, and a parallel increase in outpatient treatments, home care services, consultancy and day hospital treatments.

Information on the number of beds and on the quantity and complexity of the services provided (number of patients, average DRG weight, number of inpatient days) have been collected for each single hospital within a LHU and for each AO. The total number of beds, both ordinary and for day-hospital, are then computed for each ASL by aggregating the values of the different hospitals which belong to the same LHU. Unfortunately, disaggregated information on the costs and on the labour force are available only for AO, but are not available for each hospital within each LHU. This limitation can represent a problem for ASL units, since staff costs can be related also to community services, rather than hospital services. For such units, considering all costs as relative to the core hospital activity would be inappropriate, so that caution must be put in choosing which type of cost can be included in the study. To that purpose, the different types of costs have been selected and reorganised so as to obtain a measure of operating cost with a composition that can be comparable for ASL and AO structures. First, financial costs, extraordinary and atypical costs have been subtracted. The breakdown of the remaining costs is shown in table 1. As can be easily seen, the cost structure is rather different between ASLs and AOs. If labour costs (in particular medical staff) represent 50% of total operating costs for AO, in the case of ASL their share is only 35% in 2000-2002 and 25% in the last two years of observation. On the other hand, a large portion of costs of ASL structures is relative to

outsourced services (more than 60% in 2004), a category that is not so important (less than 10% of costs) for AOs. The share of the costs of drugs is about 3% for ASLs and 6.5% (increasing up to 8.3% in 2004) for AOs. The relative importance of operating services given out by contract (such as food services, cleaning and laundry) is different among the two types of hospitals too: it is about 2% for ASLs, and 4-5% for AOs. Finally, depreciation and administrative expenditures weight less for the former than for the latter.

The figures in table 1 clearly confirm that the two types of hospitals are not performing identical tasks. Since our aim is to identify an operating cost structure which is as much homogeneous as possible, we selected the costs items that are more closely related to the core activity of hospitals, that is the provision of health care services. We come out with a final aggregation named operating hospital costs (*OHC*, the dependent variable in our econometric model) which is the sum of the costs of the following inputs: labour, drugs, capital (the measure of which is proxied by the total number of beds)¹. As shown in table 2, for what concerns the relative weight of the different cost categories, the two types of hospitals are now much more similar. Labour costs are about 86% of operating hospital costs, while the weights of drugs and depreciation are respectively 9.6% and 4.4%. *OHC* has an average value of 79 million euro for ASLs (average yearly growth rate of 3.6%) and 122 million euro for AOs (average yearly grow rate of 4.8%).

2.2. Explanatory variables of the cost model

Exploiting the informative content of the database, we have obtained the following explanatory variables to be included in the estimation of the cost function: output, complexity of provided services (case-mix), input prices. The full sample is a panel of 29 productive units which are observed over a period of 5 years, for a total of 145 observations. As an index of production volume (*Y*) we opted for the total number of patients per year (ordinary and in day-hospital). In addition, in order to keep into account the severity of illnesses, a control variable of the average DRG weight (*DRGW*) has been added. Such a variable should reflect the differences in the production mix, i.e. the average degree of complexity of the services provided by the hospital structures².

¹ Such a restricted cost aggregate corresponds on average to 32% of total operating costs for ASL (65% for AOs).

² For example, a tonsillectomy is a typical operation with a low degree of complexity (DRG weight 0.27), while thyroid and cardiovascular operations have an average (DRG weight 1.04) and a high degree (DRG weight 2.40) of complexity, respectively.