

THE DETERMINANTS OF PUBLIC-PRIVATE MIX IN THE SUPPLY OF HOSPITAL SERVICES

Giacomo Pignataro, Ilde Rizzo
University of Catania

The hospital market in Italy is served by public and private providers. The public-private mix in the hospital services supply varies all over the country, among the different regions.

The reasons for such a diversity are investigated, combining the theoretical analysis with the empirical investigation, and the policy implications for the design of the health market at regional level are outlined.

HOSPITAL CARE PROVISION IN ITALY

THE ITALIAN NHS SYSTEM IS ORIENTED TO THE IDEA OF IMPLEMENTING "QUASI MARKETS":

- the health care services provided by NHS remain largely publicly financed (with a form of cost sharing);
- citizens are free to choose between public and private accredited producers
- contracting out is one of the tools chosen for maintaining the competition in the system

→ Hospital services, paid for by NHS, are provided by public and private producers

THERE IS A RELEVANT DEVOLUTION OF RESPONSIBILITIES TO REGIONS:

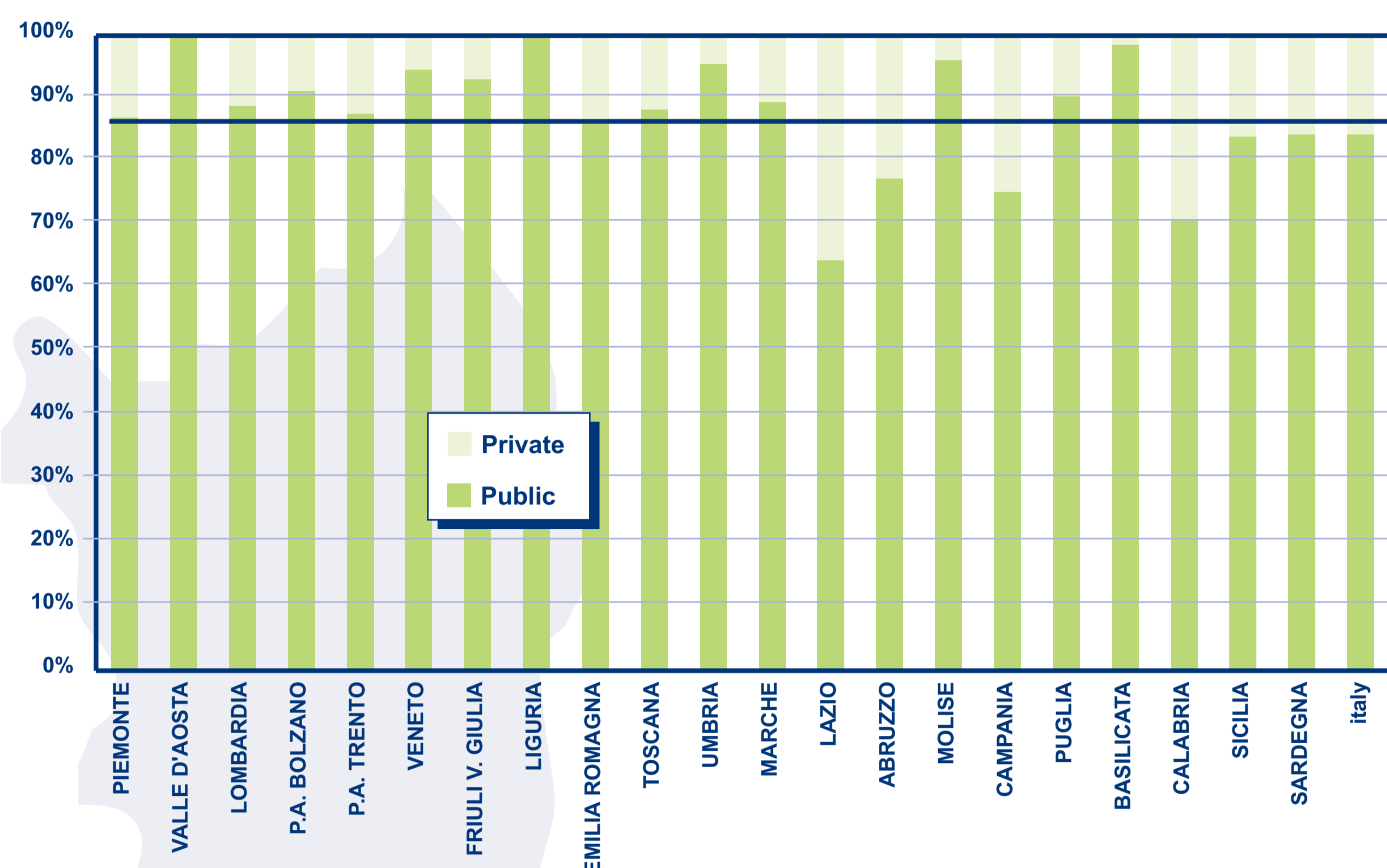
There is a considerable regional variety of financial as well as organizational arrangements: within the guidelines offered by central government, regional health systems, in fact, differ in terms of:

- fees;
- capability of monitoring expenditure;
- contracting the volume of services;
- to some extent, accreditation rules.

→ Different systems have evolved at the regional level

THE PUBLIC-PRIVATE MIX IN HOSPITAL CARE PROVISION IN THE ITALIAN REGIONS

HOSPITAL BEDS: 1995



PERCENTAGES OF DISCHARGED PATIENTS: 1996

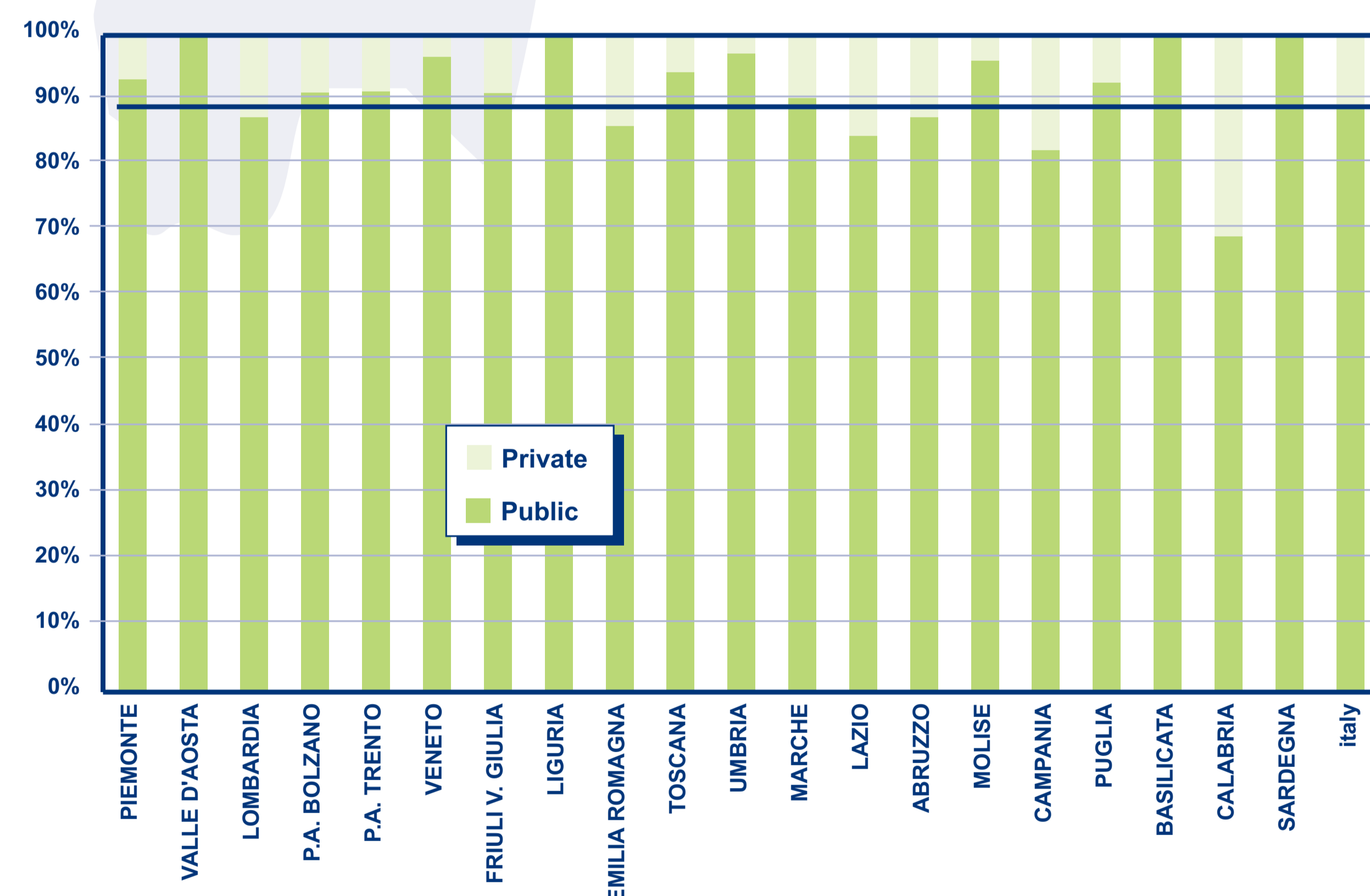


TABLE 1

Independent variables	Dependent variables								
	Hosp. pub. pe	Hosp. priv. pe	Mix_hosp	Bed. pub. pe	Bed. priv. pe	Mix_bed			
Constant	(2.22)	(-1.90)	(0.05)	(-2.48)	(1.59)	(-1.32)	(-1.23)	(-0.51)	(-0.78)
Demographic variables									
Pop_>65	(-0.16)	(0.87)			(-0.75)	(-0.43)			
Pop_<14		(-0.27)	(-0.12)	(-0.89)	(-0.82)		(-1.30)	(-1.19)	(-2.00)
Life_exp									
Years_lost		(-1.38)	(-1.69)	(-0.24)	(-2.25)		(-1.94)	(-1.84)	(-1.59)
Socio-economic v.									
Gdp	(-3.16)	(-1.97)		(-2.25)	(-0.99)				
Grad		(-1.00)	(-2.85)				(-0.26)	(-0.50)	(-0.93)
Illit							(-0.31)	(-0.31)	(-0.54)
Structural variables									
Hosp. pub. pe		(-0.75)	(-0.74)	(-0.37)	(-2.68)				
Bed. pub. pe							(-2.55)	(-2.25)	(-4.48)
Bed. priv. pe							(-1.47)	(-1.18)	
Regional dummies									
Aosta	(-1.56)		(-1.53)		(-3.09)		(-0.98)		(-2.08)
Piemonte	(-3.36)		(-1.20)		(-1.05)		(-3.37)		(-0.64)
Bolzano	(-0.81)		(-1.67)		(-0.47)		(-0.55)		(-0.75)
Trento	(-1.06)		(-1.12)		(-0.71)		(-0.41)		(-0.78)
Veneto	(-0.21)		(-0.35)		(-1.45)		(-0.16)		(-0.76)
Friuli	(-2.03)		(-0.67)		(-1.70)		(-1.26)		(-0.47)
Liguria	(-3.53)		(-1.19)		(-1.58)		(-2.95)		(-1.73)
Emilia	(-0.85)		(-2.87)		(-0.32)		(-2.58)		(-1.64)
Toscana	(-0.23)		(-1.00)		(-2.67)		(-2.92)		(-0.07)
Umbria	(-0.30)		(-0.32)		(-0.88)		(-1.66)		(-0.91)
Marche	(-0.42)		(-1.41)		(-0.05)		(-0.70)		(-0.71)
Lazio	(-0.31)		(-1.03)		(-2.80)		(-1.24)		(-1.27)
Abruzzo	(-2.79)		(-0.35)		(-0.69)		(-2.44)		(-1.09)
Molise	(-0.81)		(-0.08)		(-2.34)		(-0.61)		(-0.18)
Campania	(-1.65)		(-0.47)		(-3.01)		(-1.80)		(-0.42)
Puglia	(-0.49)		(-0.60)		(-2.55)		(-0.83)		(-1.19)
Basilicata	(-0.30)		(-0.11)		(-0.75)		(-0.63)		(-0.90)
Calabria	(-1.46)		(-2.59)		(-4.12)		(-2.72)		(-1.30)
Sardegna	(-2.63)		(-1.75)		(-0.77)		(-3.47)		(-2.07)
Adj-R ²	.238	.58	.141	.377	.125	.527	.266	.457	.131
F-statistic	14.574	6.717	4.583	3.292	4.303	5.219	11.500	4.334	4.286

Hosp. pub. pe: public hospitals per capita; Hosp. priv. pe: private hospitals per capita; Mix_hosp: % private hospitals
Bed. pub. pe: public beds per capita; Bed. priv. pe: private beds per capita; Mix_bed: % private beds
Pop_>65: population over 65 total population; Pop_<14: population below 14 total population; Life_exp: number of years of life expectancy; Years_lost: number of years lost for avoidable causes (per 100,000 inhabitants)
Gdp: GDP per capita; Grad: no. graduates/total population; Illit: no. illiterates/total population
statistics in brackets: * denoting significance at 5% level

POTENTIAL EXPLANATIONS OF THE VARIABILITY OF THE PUBLIC-PRIVATE MIX ACROSS REGIONS

The factors which can potentially affect the regional variability of the public-private mix of hospital production can be identified recalling the general analysis of markets for differentiated products.

Health care provided in hospitals may be regarded as a differentiated product. Differentiation may arise along several dimensions:

- different treatments for different diseases;
- different features of the same treatment (different surgical procedures, different severity of the same disease, different diagnostic procedures, etc.);
- different levels of comfort and assistance

The analysis of the public-private mix in hospital care can be carried out taking into account the different choices a producer, either public or private, must make:

- the decision to enter;
- the specific segments of demand that will be satisfied;
- the level and composition of its activity (number and type of admissions, etc.).

When considering these different decisions, we must bear in mind that in Italy public and private hospitals are asymmetric actors:

- the former can act as leaders because they control the entry of private hospitals in the market for the services provided by NHS;
- public hospitals, as leaders could be able to serve those segments of market which are more satisfactory, leaving other hospitals only the residual demand in the "product space" of health care.

- in practice, public hospitals motivations can be rather different;
- public hospitals are constrained by obligations to serve all the individuals in need of care.

Therefore, public hospitals will not necessarily leave other competitors a residual role.

A. THE DECISION TO ENTER THE MARKET

In general, it is negatively affected by the amount of fixed costs and positively related to the cost borne by each individual when his demand is satisfied by a product with characteristics different from the ones he prefers most.

Fixed costs may vary across regions because of:

- differences in the regional regulations for the access of private producers to the hospital market;
- difference in the efficiency of the public sector as a purchaser of production factors. Being the dominant supplier of hospital services, its purchases of these factors can be crucial for their prices and availability:
 - prices can be depressed, because of the quasi-monopsonistic position of public sector;
 - prices can be increased because of a "natural" lack of incentives to keep down costs and of the potential existence of collusion between the purchasing authorities and the sellers.
- regional inelasticities in the supply of some factors may arise especially as far as personnel are concerned. Mobility may remedy these shortages, but the salaries paid to personnel will rise.
- public hospitals set their capacity before a similar decision is taken by private entrants, this may have effects on the residual demand that is left for the latter reducing, beforehand, their profitability prospects, with a negative impact on the number of entrants in the market.

The cost borne by each individual when his demand is satisfied by a product with characteristics different from the ones he prefers most may vary across regions according to the differences of the relevant demographic (gender, age) and socio-economic (income, education, habits) determinants of demand across consumers.

B. THE DECISION TO DIFFERENTIATE

The degree of differentiation has implications for the specialisation of hospital supply: the more differentiated hospitals are the more each hospital is specialised.

There can be regional variations in the behaviour of public hospitals related to:

- the way the regional authorities play their programming role;
- the characteristics of supply of labour;
- the tariff system (which may induce variations in the relative specialisation and composition of activities between public and private producers).

C. THE DECISION ON THE LEVEL AND COMPOSITION OF ACTIVITY

The activity level and its composition may be influenced by:

- the regional payment system:
 - the direction of the effects produced by the DRG system on the levels of activity cannot be generalised
 - general inducement to increase the number of treatments;
 - concentration on few patients, but quite remunerative. This option can be played more easily by private producers.
- the decision on differentiation: the number of patients that a hospital can potentially treat depends on the segments of demand it has decided to serve.

Demand can be oriented towards private supply both for quantitative and qualitative reasons:

- public supply is insufficient to satisfy the demand in general (few beds overall);
- public supply is insufficient to satisfy a specific type of demand (few beds for specific treatments);
- public supply is unsatisfactory from a qualitative point of view, in terms of:
 - effectiveness (short life expectancy),
 - related services (ugly rooms, bad meals, etc.).

THE EMPIRICAL ANALYSIS OF THE DETERMINANTS OF THE PUBLIC-PRIVATE MIX IN HOSPITAL SERVICES

We use a linear regression model to analyse the determinants of the public-private hospital care mix. The estimation technique is OLS and the analysis is carried out at the provincial level. The sample includes 743 public hospitals and 411 private accredited hospitals distributed in 88 provinces. A regional variable has been used to take into account regional differences.

THE DEPENDENT VARIABLES

Several variables have been used to capture the different dimensions of the mix:

- the decision to enter;
- the specific segments of demand that will be satisfied;
- the level and composition of its activity

The variables used to represent the decision to enter are:

- the number of private hospitals per capita.
- the number of beds in private hospitals per capita.
- the number of private hospitals as a percentage of the total.
- the number of beds in private hospitals as a percentage of the total.

The variables sub I and II have been calculated also with respect to public hospitals.

The variables used to represent the decision to satisfy specific demand segments is:

- the average number of specialities in public and private hospitals.

The variables used to represent the decision on the level and composition of supply are:

- the number of discharged patients in public and private hospitals, per capita
- the number of discharged patients in private hospitals as a percentage of the total.
- DRG average weight in public and private hospitals
- average DRG "diversity" index for public and private hospitals. This index represents the number of discharged patients, out of 100, that fall within each DRG recorded by a hospital: this number is smaller when discharged patients are spread over a large number of different DRGs, while is higher when the variety of DRGs used in hospital is limited.

THE INDEPENDENT VARIABLES

The explanatory factors may be listed in four groups:

- demographic variables:**
 - the ratio of population over 65 to total population
 - the ratio of population below 14 to total population
 - life expectancy
 - number of years lost for avoidable causes.
- socio-economic variables:**
 - GDP per capita
 - number of graduates per 1000 inhabitants
 - number of illiterates for 1000 inhabitants.
- structural variables** representing the structure and composition of the market, expressed in terms of the public hospital size and quality.
- regional dummies.** There are 19 dummies, one less than the number of regions considered (Sicilia is missing from the data set). The coefficient of each dummy measures how much it differs from the same coefficient for Lombardia.

Data are relative to 1996 and are provided by Italy's Health Ministry, National Statistical Institute (ISTAT), Prometeo and Istituto Tagliacarne

Table 1, 2 and 3 show the three groups of regressions, carried on with respect to the three dimensions of the public-private mix.

The regression results tend to confirm some very well known tenets and offer some interesting new insights as far as the determinants of the public-private mix are concerned:

- private hospital supply is positively affected by socio-economic conditions: in all the equations it is positively correlated with the level of GDP per capita or the other variables expressing the population socio-economic status. It is confirmed, therefore, that private health care can be regarded as a luxury good;
- needs are a significant determinant for the decisions of public hospitals to enter the market and to define the level and composition of their activity;
- private hospital supply does not seem to be driven by needs (as expressed by the share of population over 65 and the other demographic variables) as much as public supply;
- needs are not a determinant of the public hospitals decisions regarding which segment of the demand to satisfy: a possible explanation is that such a decision is more influenced by the doctor's interests rather than by the patients' needs;
- private hospitals seems to be a substitute of public supply as demonstrated by the negative sign of the variables representing the structure of the market (in terms of the public hospital size and quality);
- regional dummies seem to play a significant role as determinants of the public-private mix: the explanatory power of the equations improves whenever regional dummies are included. However, the specification of the regional dimension (i.e. a dummy for each region minus one) does not allow for capturing the differences of regional regulation and, therefore, at this stage does not offer insights with this respect. Further research is needed in this direction;
- apart from the considerations sub IV, the four types of variables exhibit the same performance with respect to all the three dimensions of the public-private mix.

TABLE 2

Independent variables	Dependent variables	
	N. spec. pub	N. spec. priv
Constant	(5.30)	(8.40)
Demographic variables		
Pop_>65		(-2.22)
Pop_<14	(-0.36)	(-0.55)
Life_exp		
Years_lost		(-0.94)
Socio-economic v.		
Gdp	(-2.31)	(-1.24)
Structural variables		
Hosp. pub. pe	(-5.99)	(-4.30)
Hosp. priv. pe		(-6.80)
N. spec. pub		(-1.74)
N. spec. priv	(-2.27)	(-1.54)
Regional dummies		
Aosta	(-0.00)	(-1.65)
Piemonte	(-0.75)	(-1.03)
Bolzano	(-0.21)	(-1.25)
Trento	(-0.21)	(-1.36)
Veneto	(-0.65)	(-0.79)
Friuli	(-0.11)	(-0.25)
Liguria	(-0.72)	(-2.06)
Emilia	(-0.25)	(-0.89)
Toscana	(-0.71)	(-0.81)
Umbria	(-0.95)	(-0.75)
Marche	(-0.04)	(-1.45)
Lazio	(-0.12)	(-1.50)
Abruzzo	(-0.95)	(-0.91)
Molise	(-0.80)	(-0.46)
Campania	(-1.44)	(-1.34)
Puglia	(-0.89)	(-0.27)
Basilicata	(-0.56)	(-0.70)
Calabria	(-1.78)	(-0.49)
Sardegna	(-0.88)	(-1.23)
Adj-R ²	.331	.417
F-statistic	11.742	3.703

N. spec. pub: average number of specialities in public hospitals; N. spec. priv: average number of specialities in private hospitals
Hosp. pub. pe: public hospitals per capita; Hosp. priv. pe: private hospitals per capita
Pop_>65: population over 65 total population; Pop_<14: population below 14 total population; Life_exp: number of years of life expectancy; Years_lost: number of years lost for avoidable causes (per 100,000 inhabitants)
Gdp: GDP per capita.
statistics in brackets: * denoting significance at 5% level

TABLE 3

Independent variables	Dependent variables					
	N. pat. pub. pe	N. pat. priv. pe	Mix_pat	DRG_w. pub	DRG_w. priv	DRG_div. pub
Constant	(-1.13)	(-1.40)	(-0.34)	(-0.79)	(-2.49)	(-2.22)
Demographic variables						
Pop_>65	(-4.09)	(-4.38)				
Pop_<14		(-2.13)	(-0.43)	(-2.30)	(-3.85)	(-2.11)
Life_exp						
Years_lost					(-0.59)	(-0.20)
Socio-economic v.						
Gdp	(-0.89)	(-0.35)	(-1.81)	(-1.37)	(-2.10)	(-1.03)
Grad					(-2.44)	(-1.30)
Structural variables						
Bed. pub. pe	(-17.4)	(-14.2)			(-18.5)	(-16.89)
Bed. priv. pe					(-14.6)	(-14.6)
N. pat. pub. pe					(-1.1)	(-1.12)
N. pat. priv. pe	(-3.39)	(-3.				