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Abstract

This study investigates the determinants of healthcare expenditure in Italy from 1997 to 2007, focusing on the influence of the socio-economic factors along with demographic factors, per capita GDP and health care inputs. The results show that healthcare is not a luxury good and ageing population and doctor density play an important role in determining health expenditure; but also highlight the relevant role of social environment. Administrative corruption, education and poverty, significantly affect health expenditure suggesting possible drawbacks for healthcare decentralisation once interregional differences are taken into account.

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1. Introduction

In the last two decades the growing trend of healthcare expenditure in industrialized countries has been largely explored. The availability of the annual OECD health data has engendered a number of studies: but without reaching unanimity in the variables and econometric regressions of health care expenditure in OECD countries [surveyed in Gerdtham *et al*, (2000); Martin Martin *et al*, (2011)]. When restricting the investigation to single countries and at regional level (Di Matteo and Di Matteo, 1998; Giannoni and Hitris, 2002; Di Matteo, 2005; Crivelli *et al.*, 2006; Costa-Font and Pons-Novell, 2007), heterogeneous results have emerged from the analysis of demographic factors and healthcare inputs as determinants of healthcare expenditure. The results depend on the country object of the study: with region-specific factors and territorial decentralisation of healthcare often identified as determinants of the increase of healthcare expenditure (Di Matteo and Di Matteo, 1998; Crivelli *et al.*, 2006; Costa-Font and Pons-Novell, 2007; Mosca, 2007).

In this respect, Italy is an interesting study case. Italian national health system (NHS) has been decentralised in the 1990ôs, following a process aimed at improving the performance and constraining the costs of healthcare system. But, in Italy, Northern and Southern regions widely differ in their socio-economic structure, and the decentralisation process has fostered the divide in terms of healthcare outcomes and expenditures. The purpose of this paper is to empirically investigate the determinants of healthcare expenditure in Italy from 1997 to 2007, specifically focusing on the influence of the

socio-economic factors along with demographic factors, per capita GDP and health care inputs. Our results confirm that per capita health expenditure depends on demographic and input factors; but also highlight the relevant role of social environment. In particular administrative corruption, education and poverty, significantly affect health expenditure suggesting possible drawbacks for healthcare decentralisation once interregional differences are taken into account.

The paper is structured as follows. The next section briefly overviews the setting of Italian healthcare system and healthcare expenditure trends. The third section presents the data and specification of the model. The fourth and fifth sections discuss the results and draw conclusions.

2. The decentralisation of health care system and expenditure in Italy

The Italian National Health Service (NHS), founded in 1978, is a universal health care system providing comprehensive health insurance coverage and uniform health benefits to the whole population. In the last 15 years the Italian NHS has undergone, like other European countries, important reforms (France *et al*, 2005), in the direction of decentralisation of health management and policy responsibilities to the sub-layers of government ï 21 administrative jurisdictions, specifically 19 regions and two autonomous provinces. Since 1978, the amount of funds financing the NHS was determined by the central government. In 1999, the reform of NHS introduced the essential levels of health services (ELS), defined by central

government and provided by regional authorities. A further reform of the financing of the NHS, stated that, starting from 2001, health care funding would become a regional responsibility. However, this was only an accounting statement, as a result of a contradiction of the reform (Liberati, 2003): implying that regions had to spend enough to provide ELS, and central government had to finance regions enough to provide ELS. This separation of financing responsibilities from expenditure responsibilities of the regional governments has been considered (Mosca, 2006; Tediosi *et al.*, 2009; Citton *et al.*, 2010) a key stimulus for the uncontrolled growth of Italian health care expenditures.

This general explanation requires however a specification. The growth of healthcare expenditure varied between regions: higher in Southern (Abruzzo, Molise, Campania, Puglia, Calabria, Basilicata, Sardegna, Sicilia) than Northern (Piemonte, Val dôAosta, Trentino, Lombardia, Friuli V.G., Liguria, Emilia Romagna, Toscana, Liguria, Umbria, Marche, Lazio) regions, with a convergence in 2002 when additional central government funds were allocated to cover NHS deficits accumulated since 1994; and a decreasing trend from 2005, when further central government funds were allocated to cover NHS deficits and regions, unable to contain deficits, underwent budgetary balance plans monitored through tutoring by the Ministry of Health and the Ministry of the Economy and Finance (Tediosi *et al.*, 2009).

This situation is reported in fig. 1.

[FIGURE 1]

In Southern Regions, socio-economic conditions, social capital and administrative behavior are lower than Northern regions. There are significant difference between North and South of Italy in GDP per capita (based on National Account, respectively 31.045ú and 17.436ú) unemployment rate (respectively 3.78 and 12.24), poverty incidence (respectively 5.23 and 22.56) and administrative corruption (the rate of crimes against public administration is respectively 6.22 and 12.56). The trend of health expenditure reflects this dualism, and the decentralization process of Italian health care system has amplified the regional differences, despite an equitable (weighted capitation) resource allocation mechanism.

3. Data and empirical model

The data set is a yearly panel data for the 21 Italian administrative jurisdictions for the period 1997-2007. We collected data on public health care system from *Health for All (1997-2007)* of Italian National Account (ISTAT). The public administration corruption rate has been obtained from *Information system on justice* (ISTAT 1997-2007). Variable definitions and summary statistics are given in table 1. The dependent variable used in this paper is the per capita health care expenditure in nominal prices. The explanatory variables can be grouped into two categories: 1. Health care inputs and demographic variables (doctor density; density of hospital beds; time trend, capturing the cost of technological change differences over time; percentage of population over 75; mortality rate; regional population

density, as a proxy of urbanization); 2. Social and economic variables (per capita income; unemployment rate; relative poverty; licensed high-school students; regional administrative corruption rate).

[TABLE I]

The econometric strategy adopted is a single-equation approach (Gerdtham *et al.*, 2000; Crivelli *et al.*, 2006; Reich *et al.*, 2011). The basic econometric specification is the following:

$$\ln HE\_PC_{it} = \alpha_i + \beta_1 \ln DOCT_{it} + \beta_2 \ln BEDS_{it} + \beta_3 \ln MORT_{it}, \beta_4 \ln POP\_75_{it} + \beta_5 \ln URB_{it} + \beta_6 TIME_{it} + \beta_7 \ln INC\_PC_{it} + \beta_8 \ln EDU_{it} + \beta_9 \ln UN_{it}, + + \beta_{10} \ln POV_{it}, + \beta_{11} \ln CORR_{it} + \varepsilon_{it} \quad (1)$$

Where the subscripts i stands for region and t for time.

The *log-log* transformation of the equation (1) allows us to consider the estimated coefficients as elasticities. We apply two linear models to estimate the equation (1): the fixed-effects (LSDV) and the random-effects model (GLS). The results of the Hausman test have shown that LSDV model is to be preferred. However, we report in the next section both results, with comments based on LSDV model.

4. Results

Health care inputs and demographic variables

Our results confirm that in Italy (Giannoni and Hitiris, 2002) ageing population is a relevant determinant of health expenditure: the coefficient for the percentage of population over 75 is positive and

significantly different from zero at the 99% confidence level. In line with previous studies (Gerdtham *et al*., 2000; Di Matteo and Di Matteo, 1998; Giannoni and Hitiris, 2002; Crivelli *et al.*, 2006; Costa-Font and Pons Novell, 2007), the doctor rate impact positively on health expenditure, suggesting a supply induced demand for health services. The bed density is significant with negative sign, reflecting the strong reduction in the number of beds occurred in Italy after 2001 (Lozzi, 2008). The effect of urbanization and the time trend are not statistically significant and have negative signs.

Socio Economic variables

Our estimates support the observation (surveyed in Martin Martin *et al*., 2011) that health expenditure is not a luxury good. Income elasticity estimate is positive, with a value close to zero, that may be related to the decentralisation of healthcare system: an explanation confirmed by similar values already estimated in Italy (Giannoni and Hitiris, 2002) and also in the case of Swiss (Crivelli *et al.*, 2006) and Canadian (Di Matteo, 2005) decentralised healthcare systems. The coefficient for unemployment rate is positive but not statistically significant; while poverty rate is positive and significantly different from zero at the 90% confidence level. This is an interesting result. Despite Italian NHS is universal and provides uniform and comprehensive care to the population, the relation between health status and poverty impacts health expenditure: particularly in terms of higher costs of hospitalization, as specifically observed for low

income patients in Southern Italy (Agabiti *et al*., 2008; Marinaci *et al.*, 2009).

Numerous studies (surveyed in Groot and Den Brink, 2006) have observed that higher educated people are more informed and more assertive about the opportunities to obtain medical help, thus increasing the chance of health care use and impacting on healthcare expenditure in industrialized countries. Accordingly, we find that the coefficient for the percentage of licensed high-school students is positive and statistically significant at the 95% confidence level. A remarkable result is the estimated impact of administrative corruption on healthcare expenditure: the coefficient is positive and statistically significant at the 99% confidence level. There is large evidence (surveyed in Lewis, 2006) that corruption affects healthcare governance in developing countries: it undermines health outcomes and reduces the effectiveness of healthcare expenditure (Rajkumar and Swaroop, 2008). This implies that corruption may be a driver of healthcare expenditure: and our results suggest that this is the case of Italy, where administrative corruption is a spread phenomenon and healthcare sector has been often involved in corruption offences (Citton *et al*., 2010).

[TABLE II]

5. Conclusions

In this study we have empirically explored the determinants of healthcare expenditure in Italy, where the decentralisation of the healthcare system was allegedly aimed at controlling the growth of

expenditure. But the purpose has not been fulfilled and the decentralisation has fostered the regional divide between North and South in terms of healthcare expenditures. We have found evidence that healthcare is not a luxury good and ageing population and doctor density play an important role in determining health expenditure. But we have also found evidence that socio-economic factors matter, and do affect health expenditure.

If differences in administrative skills and socio-economic conditions are significant, decentralization may foster interregional differences in health care expenditure. Our results show that this is the case of Italy: administrative corruption, poverty and education are relevant determinants of healthcare expenditure. This suggests policy implications and drawbacks for the decentralisation of healthcare when regional differences are wide. Without improving socio-economic conditions and administrative culture in less developed regions decentralisation may enhance regional differences (Tediosi *et al.*, 2009). This may require a strong role for central government in controlling and monitoring regional healthcare outcomes and expenditures, and to equalize the starting conditions between regions.

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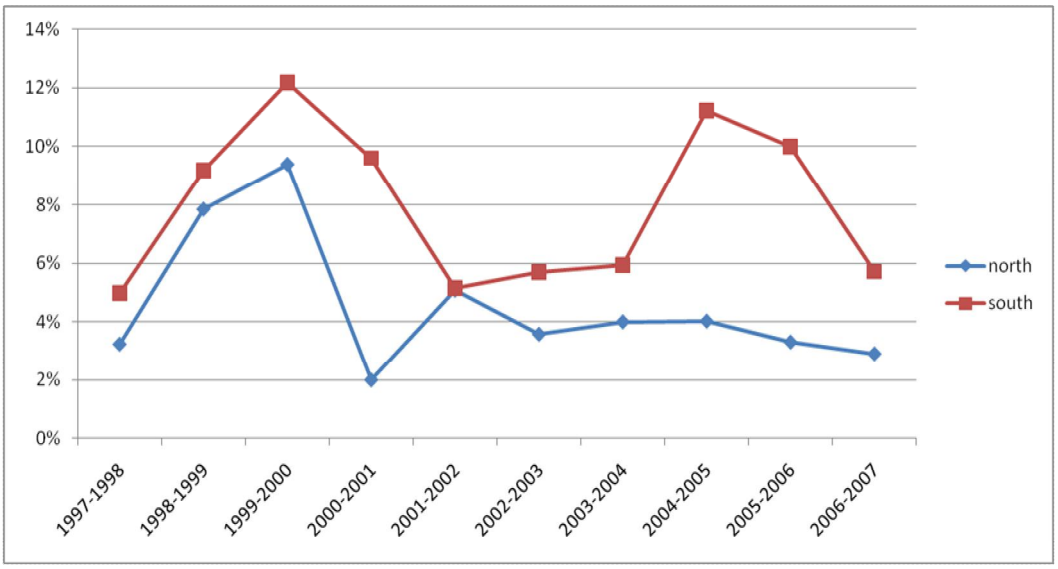
FIGURES AND TABLES

Fig.1 The growth of health expenditure in Italy (1997-2007))



Source: ISTAT, National Account

Table I Descriptive statistics

Variables	Definitions	Mean	Std. Dev.	Min	Max
HE_PC	health expenditure per capita (PPP 2005)	1377.61	285.99	793	2014
DOCT	density of doctors (doctors per 10.000 inhabitants)	19.69	2.59	11.36	27.23
BEDS	density of beds (beds per 10.000 inhabitants)	43.96	8.09	29.55	71.27
MORT	number of death/population (death per 10.000 inhabitants)	100.52	14.40	76.66	144.73
POP_75	Percentage of Regional population over 75 year	80.37	0.90	4.82	13.4
URB	the ratio of of the population to the Regional's area	176.05	105.17	36	426
TIME	Linear time trend	2002	3.17	1997	2007
INC_PC	Income per capita (PPP 2005)	21272.53	6286.78	12230	33469
EDU	the percentage of licensed high-school students (students per 10.000 inhabitants)	27.61	4.29	19.76	38.41
UN	rate of unemployement	9.54	6.53	2.44	28.01
POV	the percentage of households with an income less than 50% Italian average income	5.31	5.07	0.12	24.4
CORR	rate of regional crimes against public administration (crimes per 10.000 inhabitants)	6.91	4.14	2.35	18.1

Table II Econometric results

Coefficients	LSDV model	GLS model
CONS	7.394***	6.887***
	-3.534	-0.7
DOCT	.186*	.264**
	-0.094	-0.08
BEDS	-. 212**	-.214***
	(0,185)	-0.089
MORT	-0.073	-0.104
	-0.363	-0.17
POP_75	.756***	.264**
	-0.363	-0.129
URB	-0.7968	-.0578*
	-0.479	-0.023
TIME	0.0285	.039**
	-0.009	-0.005
INC_PC	.0321**	.0592***
	-0.0141	-0.02
EDU	.263**	.182***
	-0.086	-0.077
UN	0.0326	-.079*
	-0.029	-0.026
POV	.864*	.572**
	-0.289	-0.217
CORR	.168***	.185***
	-0.043	-0.006
within R^2	0.9323	0.9206
between R^2	0.1473	0.4046
overall R^2	0.5611	0.867

***, **, ***: significantly different from zero at the 90, 95 and 99% confidence level.**