

Effects of health care decentralization in Spain from a citizens' perspective

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Received: 19 July 2012 / Accepted: 23 April 2013 / Published online: 10 May 2013
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Abstract The aim of this article is to analyze the impact of the decentralization of the public national health system in Spain on citizens' satisfaction with different dimensions of primary and hospital care. Using micro-data from the Health Barometer 1996–2009 and taking advantage of the exogeneity of the different pace of decentralization across Spain using a difference-in-differences strategy, we find that, in general, decentralization has not improved citizens' satisfaction with different features of the health services. In our base model, we find that there are even some small negative effects on a subset of variables. Sensitivity analysis confirms that there is no empirical evidence for supporting that decentralization has had a positive impact on citizens' satisfaction with health care. We outline several possible reasons for this.

Keywords Health care · Decentralization · Spain · Citizens' satisfaction

JEL Classification H51 · H75 · I11

Introduction

Decentralization in health services has become a topical issue throughout the world, in both developed and developing countries. The aim of this article is to examine the effect of decentralization of the Spanish public health care system on citizens' satisfaction with health services using data from an annual survey on Spaniards' perception of the Spanish National Health System (NHS).

The case of Spain represents a remarkable opportunity for studying the effects of decentralization of public health services, for several reasons. First, health services in Spain are overwhelmingly public: according to the OECD Health Database 2011, public health spending in Spain amounted to 73.6 % of total health spending in 2009 (9.5 % of the GDP).¹ Therefore, the influence of decentralization is likely to be notable and relevant. Second, over the last 2 decades Spain has experienced a radical decentralization of health services: while in 1980 all responsibilities in this area corresponded to the Central Government, over the following 20 years this responsibility was completely transferred to regional administrations. According to OECD Statistics, although the central government and municipalities retain some minor responsibilities in this field, 91.6 % of public health spending in 2010 was in the

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¹ Data computed from OECD statistics on National Accounts, General Government Accounts and Government Expenditure by Function.

hands of regional governments. A third important feature of the Spanish decentralization process is that it has been completely driven by political negotiations, mostly associated with regional identities, so it can be considered reasonably exogenous to health care outcomes.² Finally, this process was implemented in different stages across different regions, which eases the isolation of the specific effect of decentralization in the analysis.

The political nature of the factors leading the decentralization process in Spain does not mean that there are no economic arguments for transferring competences to regional governments. In fact, according to economic theory, there are both reasons in favor and against decentralizing health care to regions, the former being the most often quoted in the literature. On the one side, according to the Theory of Fiscal Federalism, the main advantage of decentralization is the possibility of tailoring the supply of the public goods and services produced to local preferences [54, 55]. This improvement in the matching of preferences and supply is further improved by the dynamics described in Tiebout model [66], according to which people will move to the circumscription with a supply of public goods (and corresponding tax burden) that better suits their preferences. The growing literature on the subject has added other possible positive aspects of the decentralization of the supply of public goods and services. Some authors, like Lago and Arias [43], point out the potential increase in accountability associated with the reduction of distance between providers and customers, whereas others focus on the increase in the number of providers derived from the decentralization of competences, which might foster experimentation and innovation, particularly, the adoption of new forms of organization [21, 47].³

On the other hand, this literature has been criticized on different grounds. First, from a theoretical perspective, as Casahuga [16] argues, it can be proven that, when decisions are taken by majority vote, the conclusion of the Oates theorem only holds in those cases where there is a single individual by circumscription or when all individuals have the same demand for the public good and face the same prices-taxes. In other words, with a simple counter example, Casahuga shows that the decentralization theorem is in general false. Second, and complementarily, it is well known that the applicability of the Tiebout model is

limited by the existence of transport costs and preferences for the place of residence. Third, moving the place of decision making it closer to the citizens might increase accountability, but it also might increase the power of local lobbies and facilitate the capture of the decision maker by local power groups, maybe too small to exert similar pressure on central governments [52, 64]. From a different perspective, it can be argued that the mainstream literature of fiscal decentralization (specifically in the area of health) has not paid enough attention to other potential negative effects of the decentralization. Among such effects we could mention the following: (1) the increase in the size of administrative structures and managing costs [56, 57]; (2) a non-optimal health system structure (from an economies of scale perspective) if decentralization is politically driven;⁴ (3) a fragmentation of the bargaining power of the public sector against the pharmaceutical industry and a high dispersion of prices of health inputs across regions [33, 63]; (4) an increase in territorial inequalities in the access to health care services; (5) a lack of information related with the running of the regional health systems, associated with problems of coordination, that hinders the generalization of successful innovations [32].

Altogether, considering that the arguments of the theory of fiscal federalism are limited by the assumptions of the analysis, and the existence of both positive and negative aspects of the decentralization process of health care, it seems that the final effects of decentralization remain mostly an empirical issue and the subject of very intense debate.⁵ In those cases where the process of decentralization is capable of generating most of the advantages stressed by the theory and circumvent most of the pitfalls mentioned by its critics, the final result would be an improvement of the service in terms of both allocation and

² See, for example, Rico and Costa-i-Font [59], with a very positive evaluation of decentralization, and Braña and Serna [10, 11] and Braña [9]. Particularly, Braña and Serna [10, 11] and Braña [9] analyze and compare, policy by policy, the level to which certain competences should be transferred according to economic theory and the Spanish case, pointing that in most cases decentralization has been driven by political issues.

³ A chronology of the implementation of new forms of management across regions can be found in Ruane et al. [60].

⁴ The Spanish case is a good example of such potential problem. Among the 17 Autonomous Communities, some are small in size and with few inhabitants (such as La Rioja, with 5,000 squared kilometers and a population slightly over 300,000); some are small but very populated (notably Madrid, with 8,000 thousand squared kilometers and almost 6.5 million inhabitants), some large and sparsely populated (Castile-Leon, a region with 94,000 squared kilometers, approximately the size of Portugal, and 2.5 million inhabitants), etc. The intention has been that all regions could offer almost all kinds of health services and treatments, irrespective of their sizes or demographic and economic characteristics. It seems clear that decentralization has not been carried out keeping in mind an optimal size of jurisdictions, as regions are extremely diverse. Patients have the right to be treated in other regions if the treatment is not available in theirs. The same applies to temporary Spanish visitors to other regions. However, in practice, the different mechanisms of compensation have not worked well, which might explain some obstacles for being treated outside the region of origin reported by the media in the last years. In order to fix that, when a new compensating tool was established for this purpose was established in 2012.

⁵ See, for example, [39] for a review of theoretical and empirical research on decentralization of health care.

production. Otherwise, we would have the opposite result. But it may be that the process of devolution will lead to both, improvements and drawbacks in different aspects of the provision of health, leaving the outcome basically unchanged. The same problem is found in other areas, such as the decentralization of education. In words of Galiani and Schargrodsky [29], “the theoretical literature identifies trade-offs without establishing absolute superiority of either centralization or decentralization in the provision of public services.” This position is shared by Galiani et al. [30] and Salinas and Solé-Ollé [61], expressed as a summary of surveys of theoretical literature on decentralization of public services.

This article aims to make a contribution to this debate, in the following respects. First of all, although there are a number of papers that study, with different levels of detail, the attitudes of Spaniards toward the Welfare State and, particularly, toward the Spanish Health System or the role of the Autonomous Regions in providing health services, this study is, to our knowledge, the first to address the impact of decentralization on health care outcomes from a citizen (subjective) perspective in a rigorous way, using modern techniques of policy evaluation.⁶

Although this is only one element in the evaluation of public policies—which should address many other features, such as the cost effectiveness of interventions—users’ opinions should obviously be taken into account by policy makers and researchers in this field. This particularly applies when the main argument for decentralizing is based on the possibility of better tailoring public policies to citizens’ preferences. This article extends the scant literature on the outcomes of health care decentralization in developed countries and particularly in Spain. The works of Rey Del Castillo [58], Costa-i-Font [17, 18], López-Casasnovas et al. [48], Rico and Costa-i-Font [59], Costa-i-Font and Rico [20], Costa-i-Font and Pons-Novell [19], López-Casasnovas [47] and Repullo [56] have analyzed this issue before. For reasons of data availability, most of these studies are based on detailed descriptions or narratives that, overall, suggest that in the last 2 decades, a period when the devolution of competences to regions was very intense, policy innovation might have increased, health spending was contained and

regional disparities did not seem to widen. Furthermore, Cantarero and Pascual [15] find that the degree of decentralization of health expenditure positively affected health outcomes (infant mortality and life expectancy) during the period 1992–2003.⁷ At an international level, the number of studies is not very large; they are mainly focused on developing countries, and their results are mixed and inconclusive.⁸ Therefore, additional empirical studies such as this one should contribute to broaden our knowledge about the impact of the decentralization of health care responsibilities.

The Spanish NHS provides universal health care to all people residing in the country, funded by general taxation.⁹ A few groups (civil and military servants) have the possibility of choosing between the NHS and a range of private insurances funded by the public sector. Although it largely involves public production of health care, the last decade has witnessed a considerable increase in the importance of publicly financed but privately produced health services, through different forms of managed care. The relevance of these new forms of health care varies widely across regions. Regarding benefits, the NHS covers a broad set of health care treatments and only dental care is affected by important restrictions. In contrast to most OECD countries, the Spanish NHS is free at the point of use, with copayments limited only to prostheses, spectacles, hearing aids and drugs.¹⁰ More details on the Spanish NHS can be found in López-Casasnovas et al. [48], Muñoz de Bustillo and Antón [51] and García-Armesto et al. [31].

Decentralization was negotiated case by case by the central government and each of the 17 regions (Autonomous Communities) as part of a long process that took 20 years. It started in 1981, with the transfer of the health competences to Catalonia, and ended in 2001 with the devolution of competences to the last ten regions. The pace

⁷ Nevertheless, we have to keep in mind that the bulk of the decentralization process occurred in 2002.

⁸ See, among many others, the collective work of Saltman et al. [62], the reviews of Jiménez-Rubio et al. [39] and Kolehmainen-Aitken [42], the works of Bossert et al. [8], Arreondo et al. [6], Vargas [67] and Martínez and Rodríguez-Zamora [49] for Latin American countries, the analyses of some African experiences by Jepsson and Okuonzi [36] and Akin et al. [2], Tang and Bloom [65] on China, Jiménez-Rubio et al. [39] and Zhong [68] on Canada, Ferrario and Zanardi [27] on Italy and Cantarero and Pascual [14] on European Union countries. We comment on the results of these studies in the “Results” section.

⁹ In September 2012, the Central Government introduced some limitations to the rights to receive health care of illegal migrants in the country.

¹⁰ Recently, in the context of the fiscal crisis, a new copayment in drugs was introduced by the governments of Catalonia and Madrid (although the Constitutional Court has temporarily suspended its application until it makes a definite decision on its legality) and the Central Government decreed an increase in cost-sharing for drugs and other services such as prostheses and ambulance services.

⁶ For example, among others, the works of Del Pino [22], Calzada and Del Pino [12, 13], Del Pino et al. [23] and Díaz-Pulido et al. [25] analyze satisfaction of citizens with several public policies. The work of Díaz-Pulido et al. [25] is of particular relevance to our work. These authors, after studying the determinants of citizens’ satisfaction with education, health and pensions, conclude that there are differences in satisfaction with public services among different regions, even after controlling for the characteristics of the respondents, especially in those services run by the Autonomous Regions. Regarding health care, one can highlight the work of Álvarez and Ruiz [3], which analyzes the valuation of the National Health System by citizens from 1995 to 2004.

of the process (shown in Table 1) was not planned in advanced and was dependent, among other things, on the difficulties found in the negotiations between the parties (the Central Government and the different Autonomous Regions) regarding the conditions in which the transfer was going to take place. It is worth mentioning that some residual competences are exerted by the Central Government and that the process of devolution included the creation of some coordinating institutions, such as the Interterritorial Healthcare Council. Unfortunately, often, the utterly important mechanism of coordination is used as an instrument of partisan dispute among the different parties in power in the regional and central governments. In sum, the process of devolution has not led to a complete autonomy in health care policy, and there are still limitations and constraints associated to institutional inertia existent before decentralization and coordination mechanisms and some residual competences kept by the Central Government.

As mentioned, an interesting feature of the process regarding our work is that decentralization of health care in Spain has more to do with historical and political factors than with issues specifically related to health care. The identification strategy of the present study consists in exploiting the different timings of the decentralization process across Spanish regions, which can be reasonably

considered as exogenous to the perceived quality of services. We use the difference-in-differences (DID) method in order to take advantage of this feature.

The rest of the article unfolds as follows. Part 2 describes the main features of the database used, and part 3 explains the identification strategy and the econometric approach used in the work. Results are presented in “Results” and the final section, as usual, summarizes the main conclusions of the article.

Data

The main database used in this article is the Spanish Health Barometer, particularly, all the waves available between 1996 and 2009 (2009 was the last available data set at the time of writing this article).¹¹ This cross-sectional survey, carried out by the Centre for Sociological Research (in Spanish, *Centro de Investigaciones Sociológicas*), covers a diversity of opinions, attitudes and perceptions of Spanish citizens on the Spanish health care system. The survey is carried out three times a year (with the exception of 2003, with only two waves, and 2001, with only one) and is representative of all Spanish citizens aged 18 and above. The sample comprises more than 6,000 individuals each year, which allows generating representative results at the regional level. In 2001, only one wave was carried out, containing roughly 2,500 interviews, so regional representativeness is not granted for that year.

The Health Barometer includes 21 variables that have been present in all waves since 1996, 11 related to citizens’ perceptions on primary care and 9 related to their opinions on inpatient and outpatient hospital care. The satisfaction of people interviewed in the survey is measured using a Likert-type scale. There was a break in the structure of this scale in 2001: from 1996 to 2000, the scale ranged from 1 to 7, whereas since 2001 a 1–10 scale has been applied. This poses a potentially important problem for this article, since the law that set in motion the most recent wave of decentralization processes was passed in December 2001. In order to tackle this problem, a triple strategy was followed. First, when analyzing decentralization using a dummy variable, we assume that this change of scale has a time- and space-constant effect on the levels of the dependent variables, which can be captured by a binary variable in the econometric models. Second, the 1–7 scale is transformed in a 1–10 scale using the following rule: 1–1; 2–2.5, 3–4, 4–5.5, 5–7, 6–8.5, 7–10. This transformation assumes the equivalence between extreme values

Table 1 Chronogram of transfers of health care competences from the Central Government to Autonomous Communities in Spain (key laws)

Autonomous community	Law
Andalusia	Royal Decree (RD) 400/1984, 22nd February
Aragon	RD 1475/2001, 27th December
Asturias	RD 1471/2001, 27th December
Balearic Islands	RD 1478/2001, 27th December
Basque Country	RD 1536/1987, 6th November
Canary Islands	RD 446/1994, 11th March
Cantabria	RD 1472/2001, 27th December
Castile-La Mancha	RD 1476/2001, 27th December
Castile and Leon	RD 1480/2001, 27th December
Catalonia	RD 1517/1981, 6th July
Extremadura	RD 1471/2001, 27th December
Galicia	RD 1679/1990, 28th December
La Rioja	RD 1473/2001, 27th December
Madrid	RD 1479/2001, 27th December
Murcia	RD 1474/2001, 27th December
Navarre	RD 1680/1990, 28th December
Valencian community	RD 1612/1987, 27th November

Source: Authors’ elaboration

¹¹ There is an additional wave for 1995, but it has not been included in the analysis because some of the regional control variables have only been available since 1996.

and a constant distance between each two consecutive values. Although this conversion makes both scales formally equivalent, inspection of Fig. 1 makes it clear that the introduction of the new scale is not innocuous. For instance, in the scale used after 2001 (a 1–10 scale), people cannot respond 2.5 (or 5.5 or 8.5) simply because those values are not available in the scale. An interviewed individual would have to choose between 2 and 3. As shown in the graph, annual averages seem to be biased downwards by the scale change. If this downward bias is constant over time and regions, that is, if the change of scale only has an effect on the levels of the variables of interest that do not differ by region, the effect of the change of scale can be captured in the econometric analysis by a dummy variable indicating it. Moreover, if this assumption of an impact of the change of scale on citizens' satisfaction holds, it is irrelevant to include or not a binary variable capturing the change of scale in the DID analysis, since both treated and untreated regions would be affected in the same fashion by this issue, leaving the difference of the differences unchanged. As a third alternative to ensure that our results are not inadvertently biased by this change in the questionnaire, we replicate the analysis using only the waves available from 2001, which all use exactly the same scale.

As mentioned earlier, the data set used contains questions on the satisfaction of Spanish citizens in regard to the following 20 different aspects of the NHS. The list of items, 11 of which refer to primary care and the remaining 9 to hospital care, includes the following dimensions:

(A) Questions about primary and specialized care

- Care and assistance received from medical staff.
- Time devoted by physicians to each patient.
- Waiting time for patients before being seen by their physicians at health centers.
- Medical equipment and technology.
- Information received by patients about their health problems.
- Consultation hours.
- Ease of getting appointments.
- Home health care.
- Knowledge of patients' medical history and patient monitoring.
- Proximity of health centers.
- Confidence transmitted by doctors.

(B) Questions about hospital care

- Care and assistance received from nurses.
- Care and assistance received from doctors.
- Assistance from non-medical staff.
- Administrative procedures for hospital admission.
- Waiting time to be admitted in case of a non-urgent health problem.
- Number of people who share a hospital room.

- Medical equipment and technology.
- Information received by patients about their health problems.
- Accommodation and catering.

Methodology

Our identification strategy relies on the exogeneity of the decentralization process in Spain with respect to citizens' attitudes and opinions on the functioning of the health care system. As mentioned, this assumption can be defended in the case of Spain if one takes into account that the devolution of health care competences to regions is a process exclusively driven by political and historical reasons and concerns regional identity, as explained above. Furthermore, according to some recent surveys [45, 46], many citizens do not even know which level of government is responsible for certain public policies. Therefore, many citizens do not even know whether they are using a decentralized or a centralized system, which reinforces the argument for the exogeneity of the treatment, that is, decentralization. In this respect, we could even say that the responses are less likely to be "contaminated" by the more or less enthusiastic backing of the devolution process. Therefore, it should be clear for any outside observer that decentralization is an outcome that can be reasonably considered as exogenous to health outcomes and citizens' perceptions of the health care system.

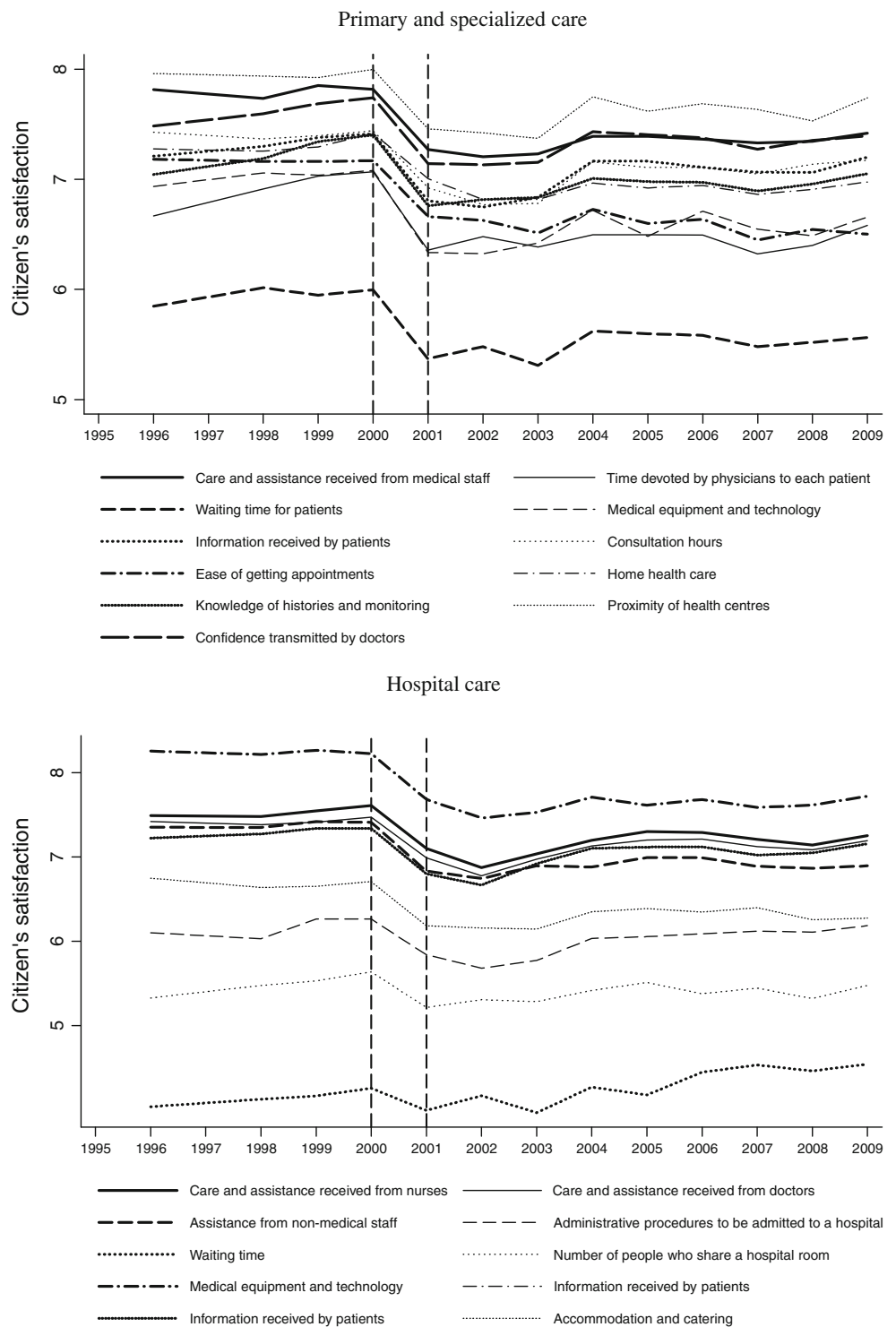
We experiment with different econometric approaches to capture the effect of decentralization on citizens' perceptions. First, we assume that the decentralization only has a level effect on citizens' satisfaction with the health care system, and we study its impact using a DID approach.¹² The control group is formed by those regions whose health care system was already decentralized at the beginning of the observation period, whereas the treatment group includes those that received competences in health care in 2002. Therefore, the most basic DID equation unfolds as follows:

$$y_{ist} = \alpha + \lambda_s + \phi_t + x'_{ist}\delta + z'_{st}\gamma + D_{st}\beta + u_{ist} \quad (1)$$

where y_{ist} is the satisfaction of individual i of region s in time t with a certain feature of the health care system, α is an intercept, λ_s and ϕ_t denote region and time effects, respectively, x_{it} is a set of individual characteristics, z_{st} represents a vector of regional covariates, D_{st} is the

¹² Details on the application of this methodology can be found in Lee [44], Angrist and Pischke [5] and Khandker et al. [41], among many others. This approach has been used to study the effects of decentralization of education in Argentina [29, 30] and Spain [61].

Fig. 1 Evolution of citizens' satisfaction with different features of the Spanish NHS (1996–2009). *Source* Authors' analysis from Health Barometer micro-data



treatment variable, which takes the value 1 in health-decentralized regions and 0 otherwise, and u_{ist} is a disturbance.

The inclusion of individual variables instead of regional average values improves the precision of the estimates, while regional variables help to reduce the bias caused by

region-specific time-varying disturbances. As it is common in most of the recent literature on policy evaluation and because we do not know of any structural model of satisfaction with health care, we adopt an eclectic approach: we estimated a reduced-form model, where regression is basically seen as a “control” tool, that is, variables that can

be considered as reasonably exogenous are introduced in the model as controls. Individual covariates, x_{it} , include sex, age, squared age, educational level and activity status.¹³ The rationale for including most of these demographic variables is discussed, for example, in Díaz-Pulido et al. [25]. Regional characteristics, which have been computed from information provided by the National Statistics Institute and are represented by z_{st} , comprise per capita GDP, total population, percentage of foreign population, percentage of population aged 65 or over, percentage of population aged <16 and political party governing the region (Socialist party, Conservative party or other, mostly nationalistic, parties). They are basically related to different levels of pressure on health services, the regional income level and the sign of the party ruling the region since different parties can have different attitudes to health care services. We intentionally excluded variables that can be related to the exact configuration of the health care system, such as the effect of different ways of management, the share of private production of health services or per capita public health spending.¹⁴ These are features that are decided and controlled by the level of government in charge of health and are themselves outcomes of the decentralization process. Given the number of dimensions of health care considered, the presentation of the results will be focused on the variables linked to decentralization.

As mentioned, the previous specification assumes that decentralization has an effect on levels of satisfaction but

¹³ Since not all waves in the database include information about whether an interviewed person is a user of the public health care system, we do not consider this variable in the analysis. Anyway, the perspective of non-users is also relevant for several reasons. First, they might use less the system because they are unsatisfied with it. Second, one might not be a user but possess a relevant knowledge of the system because of health problems of relatives, for instance. Third, collaboration between public and private producers is increasingly frequent in Spain, with many patients enjoying private care that is publicly funded. Fourth, as long as preferences as well as support of the whole population is considered a relevant variable for decentralization, satisfaction of the whole population—and not only of the most intense users—is a relevant issue.

¹⁴ We do not control for features like the different ways of organizing health care (for example, contracting out, private-finance initiatives, etc.) because our focus is on the average effects of decentralization, as usual in policy evaluation. Particularly, as mentioned, the possibility of introducing innovations consisting in new forms of organization is highlighted as one of the main advantages of decentralization [47]. In addition, since these types of innovations are indeed starting to be introduced by some regions after receiving competences in health care, such policies are outcomes of the decentralization and cannot be considered as exogenous to the devolution process. In this respect, they can be seen as what Angrist and Pischke [5, p. 63–66] call ‘bad controls’ (introducing variables that are outcomes of the treatment variable), which can yield biased estimates. In this respect, we proceed as the standard literature evaluating the impact of decentralization summarized in the article.

not on trends and that this effect materializes in a single period and immediately after decentralization took place. Although such a model is only a departure point, it is probably not very realistic. Therefore, we estimate a more flexible and preferred alternative. It aims to analyze the impact of decentralization through four binary variables (D_{st}^k with $k = 1, 2, 3, 4$), which capture whether the decentralization of health care took place 5 years ago or less, between 6 and 10 years ago, between 11 and 15 years ago and 16 years ago or more. β_k are their associated coefficients. For instance, β_1 captures the effect of D^1_{st} , which is a variable that takes the value 1 if health care in region s at time t is decentralized and 0 otherwise. The base (omitted) category is no decentralization. The interpretation of the rest of variables is the same. This specification comprises the previous model as a particular case and allows capturing, for instance, the possibility that decentralization has a lagged effect on citizens’ satisfaction or that an initial adverse impact of the process eventually disappears over time. In this case, the equation to be estimated is

$$y_{ist} = \alpha + \lambda_s + \phi_t + x'_{ist}\delta + z'_{st}\gamma + \sum_{k=1}^4 D_{st}^k \beta_k + u_{ist} \quad (2)$$

In the next section, devoted to the results, we also comment on the outcomes of other specifications using a different number of dummies and even a continuous variable denoting the number of years passed since decentralization.

In order to control for the effect of other region-specific variables that change over time, we also estimate models that include region-specific time trends (that is, regressions include the term λ_{st} , where t represents the time period). According to Angrist and Pischke [5], the inclusion of region-specific time trends helps to test the assumption of parallel trends: the robustness of empirical results to the inclusion of such trends should be interpreted as a positive signal, whereas otherwise, the plausibility of our strategy should be seen as compromised. If the results are highly sensitive to the inclusion of this set of controls, it means that it is unlikely that, in the absence of the treatment (decentralization) and controlling for observable features, opinions on health care quality would have remained the same. We have interpreted the absence of changes in the statistical significance of estimates as a signal of the robustness of the results.

The models are estimated using ordinary least squares (OLS), adjusting standard errors for different kinds of clusters (see more details below). Although the left-hand variables are not strictly continuous, in this respect we follow Angrist and Pischke’s [5] suggestion, who consider regression a good strategy in these situations

Table 2 Analysis of the impact of decentralization on variables related to primary and specialized care (1996–2009)

	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
<i>Care and assistance received from medical staff</i>								
1–5 years ago	−0.196	0.095**	−0.249	0.113**	−0.196	0.101*	−0.249	0.129*
6–10 years ago	−0.258	0.141*	−0.312	0.163*	−0.258	0.139*	−0.312	0.196
11–15 years ago	−0.426	0.162***	−0.462	0.181**	−0.426	0.138***	−0.462	0.216**
More than 15 years ago	−0.444	0.179**	−0.471	0.196**	−0.444	0.164**	−0.471	0.211**
<i>Time devoted by physicians to each patient</i>								
1–5 years ago	−0.186	0.104*	−0.264	0.127**	−0.186	0.111	−0.264	0.099**
6–10 years ago	−0.242	0.168	−0.294	0.194	−0.242	0.166	−0.294	0.226
11–15 years ago	−0.394	0.200**	−0.280	0.219	−0.394	0.170**	−0.280	0.268
More than 15 years ago	−0.541	0.217**	−0.418	0.232*	−0.541	0.169***	−0.418	0.263
<i>Waiting time for patients before being seen by their physicians at health centers</i>								
1–5 years ago	−0.450	0.128***	−0.542	0.148***	−0.450	0.135***	−0.542	0.141***
6–10 years ago	−0.452	0.191**	−0.479	0.220***	−0.452	0.181**	−0.479	0.205**
11–15 years ago	−0.828	0.226***	−0.790	0.256***	−0.828	0.213***	−0.790	0.272**
More than 15 years ago	−0.989	0.256***	−0.860	0.282***	−0.989	0.299***	−0.860	0.329**
<i>Medical equipment and technology</i>								
1–5 years ago	0.057	0.111	−0.057	0.137	0.057	0.124	−0.057	0.197
6–10 years ago	0.206	0.158	0.001	0.194	0.206	0.196	0.001	0.284
11–15 years ago	0.271	0.192	−0.148	0.227	0.271	0.273	−0.148	0.369
More than 15 years ago	0.215	0.217	−0.360	0.254	0.215	0.283	−0.360	0.397
<i>Information received by patients about their health problems</i>								
1–5 years ago	−0.072	0.100	−0.185	0.115	−0.072	0.127	−0.185	0.157
6–10 years ago	−0.014	0.147	−0.201	0.166	−0.014	0.154	−0.201	0.209
11–15 years ago	−0.116	0.186	−0.236	0.190	−0.116	0.172	−0.236	0.245
More than 15 years ago	−0.134	0.206	−0.269	0.211	−0.134	0.214	−0.269	0.262
<i>Consultation hours</i>								
1–5 years ago	0.021	0.105	−0.034	0.142	0.021	0.145	−0.034	0.186
6–10 years ago	−0.126	0.152	−0.197	0.197	−0.126	0.153	−0.197	0.230
11–15 years ago	−0.268	0.178	−0.300	0.218	−0.268	0.198	−0.300	0.278
More than 15 years ago	−0.258	0.203	−0.289	0.239	−0.258	0.206	−0.289	0.279
<i>Ease of getting appointments</i>								
1–5 years ago	−0.379	0.137***	−0.356	0.174**	−0.379	0.168**	−0.356	0.176*
6–10 years ago	−0.473	0.199**	−0.388	0.252	−0.473	0.257*	−0.388	0.262
11–15 years ago	−1.019	0.244***	−0.719	0.296**	−1.019	0.310***	−0.719	0.340*
More than 15 years ago	−1.362	0.279***	−0.963	0.340***	−1.362	0.352***	−0.963	0.400**
<i>Home health care</i>								
1–5 years ago	−0.056	0.126	−0.146	0.153	−0.056	0.162	−0.146	0.215
6–10 years ago	0.048	0.190	−0.069	0.231	0.048	0.219	−0.069	0.308
11–15 years ago	−0.122	0.238	−0.229	0.263	−0.122	0.276	−0.229	0.359
More than 15 years ago	−0.137	0.270	−0.302	0.288	−0.137	0.289	−0.302	0.351
<i>Knowledge of patients' medical history and patient monitoring</i>								
1–5 years ago	−0.129	0.099	−0.237	0.119**	−0.129	0.099	−0.237	0.103**
6–10 years ago	−0.143	0.158	−0.306	0.178*	−0.143	0.145	−0.306	0.196
11–15 years ago	−0.234	0.197	−0.280	0.203	−0.234	0.148	−0.280	0.204
More than 15 years ago	−0.366	0.216*	−0.399	0.225	−0.366	0.148**	−0.399	0.178**
<i>Proximity to health centers</i>								

Table 2 continued

	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
1–5 years ago	–0.040	0.145	–0.061	0.184	–0.040	0.165	–0.061	0.168
6–10 years ago	–0.052	0.191	–0.142	0.249	–0.052	0.204	–0.142	0.228
11–15 years ago	–0.315	0.249	–0.398	0.293	–0.315	0.301	–0.398	0.353
More than 15 years ago	–0.310	0.290	–0.414	0.335	–0.310	0.330	–0.414	0.387
<i>Confidence transmitted by doctors</i>								
1–5 years ago	–0.177	0.100	–0.317	0.113***	–0.177	0.139	–0.317	0.151*
6–10 years ago	–0.232	0.146	–0.447	0.159***	–0.232	0.159	–0.447	0.195**
11–15 years ago	–0.368	0.180**	–0.450	0.183**	–0.368	0.164**	–0.450	0.205**
More than 15 years ago	–0.404	0.195**	–0.422	0.205**	–0.404	0.189**	–0.422	0.205*
Regional fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
Clustering level	Region-year		Region-year		Region		Region	
Region-specific linear time trends	No		Yes		No		Yes	

All models include an intercept, individual-level variables (sex, age, squared age, education and situation of activity) and regional-level variables (total population, share of foreign population, share of population aged 65 and over, share of population aged <16 and political party governing the region)

In all cases, the variables of interest are a set of dummies capturing the number of years passed since decentralization

Source: Authors' analysis from Health Barometer micro-data

* statistically significant at 10 % level; ** statistically significant at 5 % level; *** statistically significant at 1 % level

because of the less demanding assumption for consistency of estimates.¹⁵

DID models have been subject to criticisms during the last decade because of their tendency to overestimate the true effects of policy changes [7, 26]. The main source of this criticism comes from the non-consideration of the possible existence of correlation within treatment and control groups (intra-cluster correlation). This problem can be associated, first, with the existence of unobservable characteristics at the level of treatment and control groups and, second, with the presence of serial correlations over time within treatment and control units. The failure to tackle these issues might yield inefficient estimates that would lead us to reject the null hypothesis of null effects and thus to overestimate the impact of policy changes.

Unfortunately, it is much less clear how to properly address this problem. Particularly, this applies to cases with

¹⁵ Furthermore, it is not possible to use a model like an ordered *logit* during the whole period of analysis: the scale change implies that, before the scale change, it only comprises 8 available values, while the change means implies 10 values can be chosen thereafter. Therefore, the number of alternatives—to be used by an ordinal *logit* model—is not constant, making the ordered *logit* not applicable to the whole period. Nevertheless, we have estimated an ordered *logit* model for the period 2001–2009 (during which there is no scale change) for the base model and the results are absolutely identical to those obtained using OLS.

a small number of groups [5], as is the case with the Spanish regions (17 Autonomous Communities). The most common strategy for addressing this problem is to compute clustered standard errors that allow for the existence of an arbitrary correlation within the treatment units. However, with a limited number of clusters, the appropriateness of this method is controversial: whereas Bertrand et al. [7] warn against its use, there are some studies focused on Canada (with only 10 states) in which Hansen [34] shows that the size of errors obtained applying this technique is appropriate (see [5]). In any case, in this article we are only analyzing at best 13 years, so the available time series is not long, and serial correlation should not be a major worry. In order to address this problem, we adopt the following eclectic perspective: first, we ignore the possible existence of serial correlation, so we have 221 region-year clusters (12 years, as there is only a single wave for 1996–1997, by 17 regions), a large enough number of groups to compute cluster-robust standard errors; second, we allow for the existence of serial correlation and we compute clustered standard errors from only 17 regional groups. In principle, unless there is negative within-cluster correlation, standard errors will be smaller in the former case than in the latter, so the standard errors resulting from the first approach can be considered as a lower bound estimate, while those obtained under the second strategy

Table 3 Analysis of the impact of decentralization on variables related to hospital care (1996–2009)

	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
<i>Care and assistance received from nurses</i>								
1–5 years ago	−0.061	0.101	−0.235	0.130*	−0.061	0.105	−0.235	0.149
6–10 years ago	−0.098	0.148	−0.265	0.182	−0.098	0.155	−0.265	0.208
11–15 years ago	−0.192	0.170	−0.435	0.199**	−0.192	0.154	−0.435	0.234*
More than 15 years ago	−0.157	0.197	−0.494	0.222**	−0.157	0.173	−0.494	0.233*
<i>Care and assistance received from doctors</i>								
1–5 years ago	−0.090	0.099	−0.237	0.128*	−0.090	0.104	−0.237	0.157
6–10 years ago	−0.229	0.145	−0.355	0.176**	−0.229	0.160	−0.355	0.217
11–15 years ago	−0.322	0.167*	−0.549	0.199***	−0.322	0.167*	−0.549	0.256**
More than 15 years ago	−0.306	0.194	−0.653	0.236***	−0.306	0.185	−0.653	0.256**
<i>Assistance from non-medical staff</i>								
1–5 years ago	0.060	0.097	−0.235	0.120*	0.060	0.100	−0.235	0.126*
6–10 years ago	0.046	0.141	−0.379	0.172**	0.046	0.153	−0.379	0.193*
11–15 years ago	0.090	0.163	−0.330	0.184*	0.090	0.157	−0.330	0.227
More than 15 years ago	0.106	0.187	−0.346	0.208*	0.106	0.192	−0.346	0.262
<i>Administrative procedures to be admitted to a hospital</i>								
1–5 years ago	−0.140	0.113	−0.322	0.128**	−0.140	0.128	−0.322	0.125**
6–10 years ago	−0.322	0.168*	−0.587	0.194**	−0.322	0.173*	−0.587	0.194***
11–15 years ago	−0.499	0.213**	−0.741	0.233***	−0.499	0.226**	−0.741	0.245***
More than 15 years ago	−0.680	0.242***	−0.905	0.269***	−0.680	0.245**	−0.905	0.264***
<i>Waiting time to be admitted in case of a non-urgent health problem</i>								
1–5 years ago	0.181	0.163	−0.108	0.198	0.181	0.230	−0.108	0.257
6–10 years ago	−0.042	0.241	−0.424	0.286	−0.042	0.221	−0.424	0.340
11–15 years ago	−0.092	0.283	−0.442	0.311	−0.092	0.275	−0.442	0.344
More than 15 years ago	−0.402	0.334	−0.673	0.355*	−0.402	0.304	−0.673	0.388
<i>Number of people who share a hospital room</i>								
1–5 years ago	−0.409	0.147***	−0.608	0.154***	−0.409	0.171**	−0.608	0.132***
6–10 years ago	−0.409	0.225*	−0.687	0.225***	−0.409	0.284	−0.687	0.253**
11–15 years ago	−0.516	0.290*	−1.025	0.245***	−0.516	0.350	−1.025	0.308***
More than 15 years ago	−0.733	0.335**	−1.383	0.270***	−0.733	0.406*	−1.383	0.344***
<i>Medical equipment and technology</i>								
1–5 years ago	0.081	0.119	−0.131	0.150	0.081	0.162	−0.131	0.201
6–10 years ago	0.213	0.162	−0.076	0.202	0.213	0.186	−0.076	0.247
11–15 years ago	0.174	0.200	−0.234	0.233	0.174	0.237	−0.234	0.333
More than 15 years ago	0.319	0.230	−0.239	0.272	0.319	0.251	−0.239	0.336
<i>Information received by patients about their health problems</i>								
1–5 years ago	−0.009	0.103	−0.114	0.133	−0.009	0.103	−0.114	0.149
6–10 years ago	0.064	0.145	−0.075	0.178	0.064	0.141	−0.075	0.205
11–15 years ago	0.003	0.169	−0.187	0.204	0.003	0.170	−0.187	0.234
More than 15 years ago	−0.059	0.189	−0.308	0.233	−0.059	0.176	−0.308	0.224
<i>Accommodation and catering</i>								
1–5 years ago	−0.183	0.126	−0.242	0.162	−0.183	0.108	−0.242	0.146
6–10 years ago	−0.104	0.188	−0.198	0.237	−0.104	0.157	−0.198	0.217
11–15 years ago	−0.195	0.224	−0.370	0.258	−0.195	0.180	−0.370	0.255
More than 15 years ago	−0.276	0.256	−0.576	0.279**	−0.276	0.224	−0.576	0.271**
Regional fixed effects	Yes		Yes		Yes		Yes	

Table 3 continued

	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Year fixed effects	Yes		Yes		Yes		Yes	
Clustering level	Region-year		Region-year		Region		Region	
Region-specific linear time trends	No		Yes		No		Yes	

All models include an intercept, individual-level variables (sex, age, squared age, education and situation of activity) and regional-level variables (total population, share of foreign population, share of population aged 65 and over, share of population aged <16 and political party governing the region)

In all cases, the variables of interest are a set of dummies capturing the number of years passed since decentralization taking no decentralization as the reference category

Source: Authors' analysis from Health Barometer micro-data

* Statistically significant at 10 % level; ** statistically significant at 5 % level; *** statistically significant at 1 % level

can be seen as conservative. True standard errors should be between both. Fortunately, as can be observed in the results section, differences in size between both types of standard errors are unimportant.¹⁶

The approach we follow in order to validate our estimates is eminently pragmatic: first, we tend to rely only on those estimates that are robust to the inclusion of time trends, which indicates that the DID approach might be an appropriate strategy. Otherwise, the assumption of parallel trends is not reasonable, and the results from the analysis of that variable would be misguided. Second, as we try several specifications under different assumptions, we tend to focus on those variables for which results are robust to the different approaches.

Results

Descriptive statistics of the variables used in the analysis are shown in the annex (Table 7). The number of variables, the variety of models considered in the analysis and the limitations of space make it sensible to focus only on one

subset of the results and commenting on the results obtained under different alternative specifications. In our view, as mentioned, the most flexible specification is the one that captures the impact of decentralization through the inclusion of several dummy variables. This model can account for different patterns of impact of the decentralization on satisfaction. For example, if the eventual effects of decentralization are only observable after some years or alternatively they disappear after a possible first-moment impact, this sort of specification will reflect it. This kind of process can be captured by an econometric specification using fictitious variables. Nevertheless, it is of course also important to consider the results obtained in other types of models. These results are readily available from the authors upon request. In some cases, the results obtained differ across models, which, in principle, should not be a major problem since the assumptions behind each specification might be rather different. For instance, an effect that disappears over time captured by a set of dummy variables is different from an instantaneous impact of decentralization; if the former model is the most adequate, the assumption of parallel trends in another one only including a binary variable for decentralization will be violated.

The whole set of results involves almost a thousand regressions, which are obviously impossible to comment in detail here. Therefore, we focus our comments on those cases where the results are robust to the inclusion of region-specific time trends and to the period of analysis considered. The lack of robustness to the inclusion of time trends would indicate that the DID strategy might not be adequate for causal analysis in the cases of the variables involved, while the sensitivity to the period of analysis can be interpreted as problems related to the change of scale. In this respect, we interpret the results in a very conservative

¹⁶ There is another reflection that is worth mentioning and according to which one should not care very much about adjusting the errors once the variance associated to individuals is considered. While interviewed individuals represent a sample of population of each region, Autonomous Communities are not a sample of the population of clusters: they are the population of clusters itself. Therefore, as suggested by a very well-known article of McCloskey and Ziliak [50], one should wonder if statistical inference is needed (of course, we refer to inference with respect to the clusters/regions; individuals continue being a sample and inference regarding them is needed). In other words, all randomness in the database is associated to individuals.

Table 4 Analysis of the impact of decentralization on variables related to primary and specialized care (2001–2009)

	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
<i>Care and assistance received from medical staff</i>								
1–5 years ago	−0.329	0.116***	−0.333	0.148**	−0.329	0.126**	−0.333	0.145**
6–10 years ago	−0.367	0.164**	−0.338	0.200*	−0.367	0.163**	−0.338	0.218
11–15 years ago	−0.490	0.181***	−0.593	0.202***	−0.490	0.149***	−0.593	0.221**
More than 15 years ago	−0.564	0.195***	−0.686	0.210***	−0.564	0.155***	−0.686	0.226***
<i>Time devoted by physicians to each patient</i>								
1–5 years ago	−0.311	0.182*	−0.334	0.155**	−0.311	0.160*	−0.334	0.113***
6–10 years ago	−0.258	0.241	−0.159	0.232	−0.258	0.287	−0.159	0.172
11–15 years ago	0.106	0.270	0.273	0.272	0.106	0.291	0.273	0.220
More than 15 years ago	−0.112	0.303	0.072	0.305	−0.112	0.327	0.072	0.254
<i>Waiting time for patients before being seen by their physicians at health centers</i>								
1–5 years ago	−0.513	0.177***	−0.493	0.176***	−0.513	0.129***	−0.493	0.134***
6–10 years ago	−0.417	0.233*	−0.371	0.290	−0.417	0.216*	−0.371	0.236
11–15 years ago	−0.549	0.297*	−0.746	0.338**	−0.549	0.293*	−0.746	0.328**
More than 15 years ago	−0.753	0.336**	−0.955	0.378**	−0.753	0.327**	−0.955	0.393**
<i>Medical equipment and technology</i>								
1–5 years ago	−0.220	0.177	−0.272	0.168	−0.220	0.178	−0.272	0.197
6–10 years ago	−0.206	0.226	−0.407	0.242*	−0.206	0.251	−0.407	0.315
11–15 years ago	−0.111	0.278	−0.135	0.252	−0.111	0.341	−0.135	0.330
More than 15 years ago	−0.231	0.318	−0.326	0.278	−0.231	0.365	−0.326	0.365
<i>Information received by patients about their health problems</i>								
1–5 years ago	−0.318	0.117***	−0.311	0.155**	−0.318	0.126**	−0.311	0.136**
6–10 years ago	−0.308	0.160*	−0.319	0.214	−0.308	0.161*	−0.319	0.221
11–15 years ago	0.054	0.170	0.014	0.204	0.054	0.139	0.014	0.196
More than 15 years ago	−0.015	0.190	−0.097	0.223	−0.015	0.142	−0.097	0.226
<i>Consultation hours</i>								
1–5 years ago	−0.341	0.138**	−0.246	0.167	−0.341	0.148**	−0.246	0.155
6–10 years ago	−0.545	0.191***	−0.419	0.235*	−0.545	0.233**	−0.419	0.233*
11–15 years ago	−0.812	0.226***	−0.589	0.258**	−0.812	0.251***	−0.589	0.232**
More than 15 years ago	−0.836	0.254***	−0.654	0.282**	−0.836	0.251***	−0.654	0.243**
<i>Ease of getting appointments</i>								
1–5 years ago	−0.731	0.192***	−0.617	0.162***	−0.731	0.199***	−0.617	0.191***
6–10 years ago	−0.788	0.259***	−0.707	0.251***	−0.788	0.337***	−0.707	0.239***
11–15 years ago	−1.636	0.358***	−1.189	0.329***	−1.636	0.410***	−1.189	0.306***
More than 15 years ago	−1.909	0.400***	−1.522	0.374***	−1.909	0.434***	−1.522	0.336***
<i>Home health care</i>								
1–5 years ago	−0.333	0.150**	−0.259	0.183	−0.333	0.209	−0.259	0.212
6–10 years ago	−0.283	0.223	−0.191	0.265	−0.283	0.310	−0.191	0.326
11–15 years ago	−0.684	0.307**	−0.703	0.343**	−0.684	0.276**	−0.703	0.307**
More than 15 years ago	−0.718	0.348**	−0.850	0.386**	−0.718	0.325**	−0.850	0.347**
<i>Knowledge of patients' medical history and patient monitoring</i>								
1–5 years ago	−0.349	0.147**	−0.338	0.138**	−0.349	0.142**	−0.338	0.109***
6–10 years ago	−0.339	0.199*	−0.200	0.212	−0.339	0.214	−0.200	0.156
11–15 years ago	−0.102	0.247	0.097	0.234	−0.102	0.213	0.097	0.171
More than 15 years ago	−0.334	0.282	−0.080	0.266	−0.334	0.224	−0.080	0.179
<i>Proximity to health centers</i>								

Table 4 continued

	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
1–5 years ago	–0.504	0.198**	–0.461	0.196**	–0.504	0.159***	–0.461	0.200**
6–10 years ago	–0.536	0.245**	–0.442	0.274	–0.536	0.242**	–0.442	0.318
11–15 years ago	–1.293	0.299***	–0.950	0.307***	–1.293	0.293***	–0.950	0.283***
More than 15 years ago	–1.278	0.363***	–0.881	0.344**	–1.278	0.383***	–0.881	0.346**
<i>Confidence transmitted by doctors</i>								
1–5 years ago	–0.461	0.107***	–0.528	0.148***	–0.461	0.121***	–0.528	0.124***
6–10 years ago	–0.514	0.153***	–0.551	0.203***	–0.514	0.147***	–0.551	0.170***
11–15 years ago	–0.401	0.194**	–0.283	0.245	–0.401	0.149**	–0.283	0.159*
More than 15 years ago	–0.398	0.209*	–0.195	0.257	–0.398	0.170**	–0.195	0.172
Regional fixed effects	Yes		Yes		Yes		Yes	
Year fixed effects	Yes		Yes		Yes		Yes	
Clustering level	Region-year		Region-year		Region		Region	
Region-specific linear time trends	No		Yes		No		Yes	

All models include an intercept, individual-level variables (sex, age, squared age, education and situation of activity) and regional-level variables (total population, share of foreign population, share of population aged 65 and over, share of population aged <16 and political party governing the region)

In all cases, the variables of interest are a set of dummies capturing the number of years passed since decentralization

Source: Authors' analysis from Health Barometer micro-data

* Statistically significant at 10 % level; ** statistically significant at 5 % level; *** statistically significant at 1 % level

way, trying to focus on (and give more credit to) those results that are robust to the inclusion of the mentioned time trends and the consideration of different periods of analysis.

Tables 2, 3, 4 and 5 display the results obtained under the econometric specification with four fictitious variables to capture the effect of decentralization during the periods 1996–2009 (Tables 2, 3) and 2001–2009 (Tables 4, 5). Four different models are presented in the tables: model I, which does not include region-specific linear time trends and cluster errors at the region-year level; model II, which is similar to model I but includes linear time trends; model III, which does not include region-specific linear time trends and cluster errors at the region level and, lastly, model IV, which is similar to model III but includes regional time trends. For obvious reasons of space, the tables only display the coefficients and standard errors of the decentralization variables.

The main findings are the following. First, regarding primary and specialized health care, the results are robust to the inclusion of linear time trends or the period of analysis considered in only 5 out of 11 variables: care and assistance received from medical staff, waiting time for patients, medical equipment and technology, ease of getting appointments and confidence transmitted by doctors. On the one side, we find a significant negative effect of

decentralization, which increases over time, on the care and assistance received from medical staff, the ease of getting appointments and the waiting time for patients before being seen by their physicians at health centers. On the other side, the evidence of a null impact of decentralization on health care cannot be ruled out in the case of the citizens' opinions about the medical equipment and technology. In addition, citizens' perception of confidence transmitted by doctors seems to decrease the first years after decentralization in most of the econometric models. The results obtained for the rest of the variables are not robust to the inclusion of linear regional time trends or the period of analysis, which casts doubts on the usefulness of the empirical strategy in the case of these items (Tables 2 and 4).

Second, in relation to hospital care, there are 3 out of 9 variables for which results are roughly robust to the inclusion of time trends and the period of analysis: waiting time to be admitted in cases of non-urgent problems, number of people sharing hospital rooms and information received by patients. The impact of decentralization seems to be negative in the case of the number of people sharing hospital rooms, whereas waiting times and information received by patients are not affected by decentralization according to our results. In addition, we can comment on the results obtained for care and assistance received from doctors and administrative procedures to be admitted to a

Table 5 Analysis of the impact of decentralization on variables related to hospital care (2001–2009)

	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
<i>Care and assistance received from nurses</i>								
1–5 years ago	−0.151	0.152	−0.261	0.149*	−0.151	0.133	−0.261	0.171
6–10 years ago	−0.145	0.198	−0.309	0.209	−0.145	0.200	−0.309	0.261
11–15 years ago	−0.146	0.233	−0.351	0.225	−0.146	0.223	−0.351	0.211
More than 15 years ago	−0.114	0.262	−0.283	0.239	−0.114	0.213	−0.283	0.236
<i>Care and assistance received from doctors</i>								
1–5 years ago	−0.250	0.155	−0.354	0.128***	−0.250	0.128*	−0.354	0.150**
6–10 years ago	−0.298	0.197	−0.471	0.190**	−0.298	0.208	−0.471	0.241*
11–15 years ago	−0.294	0.244	−0.407	0.232*	−0.294	0.224	−0.407	0.207*
More than 15 years ago	−0.283	0.273	−0.376	0.254	−0.283	0.213	−0.376	0.229
<i>Assistance from non-medical staff</i>								
1–5 years ago	−0.269	0.132**	−0.348	0.134**	−0.269	0.145*	−0.348	0.158**
6–10 years ago	−0.263	0.174	−0.449	0.189**	−0.263	0.200	−0.449	0.222*
11–15 years ago	0.136	0.201	−0.199	0.208	0.136	0.228	−0.199	0.211
More than 15 years ago	0.048	0.247	−0.271	0.246	0.048	0.261	−0.271	0.274
<i>Administrative procedures to be admitted to a hospital</i>								
1–5 years ago	−0.155	0.160	−0.265	0.144*	−0.155	0.178	−0.265	0.149*
6–10 years ago	−0.305	0.199	−0.574	0.210***	−0.305	0.243	−0.574	0.215**
11–15 years ago	−0.238	0.249	−0.352	0.269	−0.238	0.262	−0.352	0.199*
More than 15 years ago	−0.453	0.286	−0.438	0.295	−0.453	0.284	−0.438	0.233*
<i>Waiting time to be admitted in case of a non-urgent health problem</i>								
1–5 years ago	0.173	0.202	0.257	0.241	0.173	0.243	0.257	0.222
6–10 years ago	0.122	0.282	0.114	0.329	0.122	0.367	0.114	0.273
11–15 years ago	0.075	0.311	−0.012	0.346	0.075	0.348	−0.012	0.347
More than 15 years ago	−0.292	0.378	−0.286	0.392	−0.292	0.382	−0.286	0.420
<i>Number of people who share a hospital room</i>								
1–5 years ago	−0.501	0.168***	−0.694	0.191***	−0.501	0.196**	−0.694	0.211***
6–10 years ago	−0.536	0.228**	−0.937	0.278***	−0.536	0.350	−0.937	0.373**
11–15 years ago	−0.841	0.300***	−1.253	0.325***	−0.841	0.362**	−1.253	0.356***
More than 15 years ago	−1.088	0.340***	−1.534	0.367***	−1.088	0.372**	−1.534	0.391***
<i>Medical equipment and technology</i>								
1–5 years ago	−0.252	0.164	−0.383	0.178**	−0.252	0.192	−0.383	0.209*
6–10 years ago	−0.230	0.212	−0.476	0.236**	−0.230	0.255	−0.476	0.285
11–15 years ago	0.084	0.288	−0.205	0.299	0.084	0.289	−0.205	0.268
More than 15 years ago	0.174	0.328	−0.054	0.327	0.174	0.263	−0.054	0.315
<i>Information received by patients about their health problems</i>								
1–5 years ago	−0.133	0.156	−0.133	0.148	−0.133	0.139	−0.133	0.154
6–10 years ago	−0.070	0.199	−0.133	0.204	−0.070	0.214	−0.133	0.219
11–15 years ago	0.233	0.219	0.183	0.225	0.233	0.224	0.183	0.215
More than 15 years ago	0.169	0.259	0.110	0.263	0.169	0.227	0.110	0.272
<i>Accommodation and catering</i>								
1–5 years ago	−0.268	0.173	−0.481	0.199**	−0.268	0.168	−0.481	0.202**
6–10 years ago	−0.196	0.227	−0.596	0.279**	−0.196	0.221	−0.596	0.294**
11–15 years ago	−0.446	0.259*	−0.884	0.282***	−0.446	0.252*	−0.884	0.247***
More than 15 years ago	−0.705	0.307**	−1.028	0.327***	−0.705	0.302**	−1.028	0.327***
Regional fixed effects	Yes		Yes		Yes		Yes	

Table 5 continued

	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error	Coefficient	Standard error
Year fixed effects	Yes		Yes		Yes		Yes	
Clustering level	Region-year		Region-year		Region		Region	
Region-specific linear time trends	No		Yes		No		Yes	

All models include an intercept, individual-level variables (sex, age, squared age, education and situation of activity) and regional-level variables (total population, share of foreign population, share of population aged 65 and over, share of population aged <16 and political party governing the region)

In all cases, the variables of interest are a set of dummies capturing the number of years passed since decentralization, taking no decentralization as the reference category

Source: Authors' analysis from Health Barometer micro-data

* Statistically significant at 10 % level; ** statistically significant at 5 % level; *** statistically significant at 1 % level

hospital. In both cases, all models displays negative coefficients; however, while they are statistically different from zero in most cases, in some of the specifications in the former item and in the last period in the latter variable, standard errors are large and we cannot rule out the hypothesis of a null effect of decentralization (Tables 3 and 5).

In sum, we find robust results for 8 of 20 variables. In four of these cases, the impact of health care decentralization appears to be negative, while in the remaining four we do not find any effect significantly different from zero.

An important issue to be discussed here refers to the results obtained under the alternative econometric specifications mentioned in section “Methodology”. As mentioned, our preference for the model using several dummies is based on its flexibility for capturing the impact of the policy of interest and its ability to generalize other models. In this respect, we have used four dummies (which correspond to 5 categories including the reference category), which is a quite reasonable number according to the number of observations available. The alternative specifications are the following ones: a model with a binary variable capturing decentralization (using several ways of taking into account the change of scale), a model with 3 dummies (1–7 years since decentralization, 8–13 years, more than 13 years), a model with 2 dummies (1–7 years since decentralization, more than 7 years) and a model with a continuous variable capturing the number of years since decentralization. In all cases, we have estimated the model for the both the periods 1996–2009 and 2001–2009. These results are summarized in Table 6 (detailed results are available upon request). The main message that emerges from them is that the empirical evidence does not allow rejecting the null hypothesis of no effect of decentralization on health care satisfaction in Spain. In most of the cases where the DID analysis is suitable there is no significant effect of decentralization or even its impact

is negative. Only in 2 out of 220 cases (20 variables and 11 models) are there positive effects of decentralization on a satisfaction variable.

Obviously, this quantitative analysis does not allow us to examine which particular factors can drive the absence of a positive impact of decentralization (or any other result), which should be addressed in future research. In any case, this result should not come as a surprise. As we argued in the introduction, there are good reasons to believe that the decentralization process of health care services can have both positive and negative implications for the system. Our findings might simply mean that, on average, such positive and negative impacts cancel out. Obviously, as we are considering the whole system, that is, the average impact on all the Autonomous Regions, it could very well be that in some regions the impact has been positive, while the opposite is true in others. Unfortunately such analysis escapes from both the methodology used and the aim of the article.

We can only speculate about the dynamics that could explain the results obtained. A first suspect would be the above-mentioned heterogeneous nature of the Autonomous Regions. If there is such a thing as an optimal size, in terms of population or extension or both, for running the health system, it cannot fit all Spanish regions simultaneously. It could be argued that nothing guarantees that the country itself adjusts to the optimal size, but in that case, it can be argued too that the Central Government probably has fewer restrictions in order to tailor the administration of the NHS to fit the optimal size. A complementary explanation is related to the assumption of heterogeneous preferences of the population across the regions and the supposedly better ability of the regional government to adapt to such different preferences. In this respect, the item of Health Barometer where there is the largest consensus among respondents, regardless of the region of residence, is their desire to have all regional

Table 6 Results of the sensitivity analysis

		Decentralization variable											
		Binary variable	Binary variable	Binary variable	Four dummies: 1-5, 6-10, 11-15, +15 years since decentralization	Four dummies: 1-5, 6-10, 11-15, +15 years since decentralization	Three dummies: 1-7, 8-13, +13 years since decentralization	Three dummies: 1-7, 8-13, +13 years since decentralization	Two dummies: 1-7 years since decentralization, +7 years	Two dummies: 1-7, +7 years since decentralization	Continuous variable: years since decentralization	Continuous variable: years since decentralization	
Scale adjustment	No	Yes	Not needed	Yes	Not needed	Yes	Not needed	Yes	Not needed	Yes	Not needed	Yes	Not needed
Period	1996-2009	1996-2009	2001-2009	1996-2009	2001-2009	1996-2009	2001-2009	1996-2009	2001-2009	1996-2009	2001-2009	1996-2009	2001-2009
<i>Primary and specialized care</i>													
Care and assistance received from medical staff	0	∅	-	-	0	∅	∅	0	∅	∅	-	0	0
Time devoted by physicians to each patient	∅	∅	∅	∅	0	∅	0	∅	-	∅	∅	∅	∅
Waiting time for patients before being seen by their physicians at health centers	∅	∅	-	-	0	∅	0	∅	∅	∅	∅	0	∅
Medical equipment and technology	0	0	0	0	0	0	0	0	∅	∅	∅	∅	∅
Information received by patients about their health problems	0	∅	-	0	-	0	∅	0	∅	∅	∅	0	0
Consultation hours	0	0	∅	0	-	0	0	0	∅	∅	∅	∅	-
Ease of getting appointments	∅	0	-	-	∅	∅	0	∅	∅	∅	∅	∅	∅
Home health care	∅	0	∅	0	-	0	0	0	0	∅	0	∅	+
Knowledge of patients' medical history and patient monitoring	∅	∅	∅	∅	0	0	0	0	∅	∅	0	0	0
Proximity of health centres	0	0	-	0	-	0	-	0	0	∅	∅	0	0
Confidence transmitted by doctors	0	∅	-	-	0	∅	0	∅	∅	∅	-	0	0

Table 6 continued

		Decentralization variable									
	Binary variable	Binary variable	Binary variable	Four dummies: 1-5, 6-10, 11-15, +15 years since decentralization	Four dummies: 1-5, 6-10, 11-15, +15 years since decentralization	Three dummies: 1-7, 8-13, +13 years since decentralization	Three dummies: 1-7, 8-13, +13 years since decentralization	Two dummies: 1-7 years since decentralization, +7 years	Two dummies: 1-7, +7 years since decentralization	Continuous variable: years since decentralization	Continuous variable: years since decentralization
Scale adjustment Period	No 1996-2009	Yes 1996-2009	Not needed 2001-2009	Yes 1996-2009	Not needed 2001-2009	Yes 1996-2009	Not needed 2001-2009	Yes 1996-2009	Not needed 2001-2009	Yes 1996-2009	Not needed 2001-2009
Hospital care											
Care and assistance received from nurses	0	∅	∅	∅	0	0	0	∅	0	0	∅
Care and assistance received from doctors	0	0	∅	∅	∅	0	0	0	0	0	∅
Assistance from non-medical staff	0	0	-	∅	0	0	0	∅	0	∅	∅
Administrative procedures to be admitted to a hospital	∅	0	0	-	∅	∅	0	0	0	0	∅
Waiting time to be admitted in case of a non-urgent health problem	∅	∅	∅	0	0	+	0	∅	0	∅	0
Number of people who share a hospital room	-	-	-	-	-	0	0	∅	0	∅	∅
Medical equipment and technology	0	0	∅	0	∅	0	0	0	0	0	∅
Information received by patients about their health problems	∅	0	0	0	0	0	0	0	0	0	0
Accommodation and catering	∅	∅	∅	0	-	0	0	∅	0	∅	∅

Source: Authors' analysis from Health Barometer micro-data

+ : at least statistically significant at 10 % and positive; - : at least statistically significant at 10 % and negative; 0 : not statistically different from zero; ∅ : not robust to the inclusion of regional time trends (DID not reliable)

governments agreeing in the catalogue of new services covered by the NHS (85 % in the 2011 wave of the barometer). Nevertheless, the possibility of adapting health services to the preferences of the citizens at a regional level is the major advantage of decentralization according to the theory. If the citizens give up this advantage, the process is to a large extent emptied of its *raison d'être*, and there would be no reason to expect an improvement in satisfaction following decentralization. Third, the review of the results obtained by the empirical literature that has studied the impact of decentralization of the health system on different indicator of health shows that the lack of impact or even negative impact is not such an unexpected result as some seem to believe.¹⁷ In the fourth place, in a very cautious and speculative way, it can be mentioned that, during the last months of 2012, the media has highlighted the links between politicians and private health care firms in some regions (particularly,

Valencian Community, Castile-La Mancha, Madrid and Catalonia), with a relevant number of cases of 'revolving door' [1, 24]. At the same time, private producers are being given an increasing role in publicly funded health care, a policy that is allowed by the devolution of competences. Whether these news are anecdotic or might reflect serious concerns related to lobbying at the regional level remains to be seen. Finally, decentralization has allowed regions to have more freedom to organize health care, which can mean larger short-term budget constraints, more outsourcing and more participation of private health care producers in many regions, which might be perceived negatively by citizens.¹⁸

Conclusions

The aim of this article has been to study whether there was any relevant positive change in satisfaction associated with the decentralization of the Spanish NHS. The answer is a cautioned no: we have not been able to find any major impact of the process of devolution on subjective satisfaction. Using a DID approach, this article has exploited the exogenous variations in the time path of the decentralization process across Spanish regions to analyze the impact of the devolution of health care competences on a set of variables associated with citizens' satisfaction concerning several features of health services. We have used a wide range of econometric specifications, and in the cases where the DID can be considered as appropriate (that is, the parallel trends assumption seems to hold), the results obtained in the analyses suggest either a small negative or a null impact of decentralization on health care. In sum, according to the evidence provided by this study, decentralization of health care does not seem to have resulted in an improvement of citizens' satisfaction with these kinds of services in Spain.

Finally, in order to be rigorous, it is important to bear in mind that the variables considered in this study only represent a partial subjective evaluation of health services. In this respect, the features examined here only capture the perceptions of citizens and patients, who might not have enough information or knowledge to judge the quality of health care facilities and services in some cases. Nevertheless, the usefulness of this approach is clearly justified for three reasons. First, it provides a complementary picture of the situation of health care provided by more objective indicators.¹⁹ Second,

¹⁷ For instance, Khaleghian [40] finds no effect of decentralization on immunization in middle-income countries, the study of Andrei et al. [4] does not detect any significant impact of the regional share of spending on either infant mortality or life expectancy in Romania, the work of Vargas [67] reports that centralized health care providers perform better than decentralized ones in rural areas in Mexico, and Martínez and Rodríguez-Zamora [49] point to the lack of impact of decentralization on different health indicators in the same country. An important part of the empirical literature on this issue concentrates on low- and middle-income countries using infant mortality rates as the dependent variable (see the review of Jimenez-Rubio [37]). Such literature concludes that there is a negative impact of decentralization of health on infant mortality rates. This impact is higher the lower the per capita income of the country. In fact, some authors [40] limit the positive impact of decentralization to low income countries (in middle income countries the impact is negative). In contrast, the results for Uganda of Akin et al. [2] suggest that for reasons including inter-district spillover benefits of public goods decentralization does not necessarily increase social welfare. For developed countries (European Union member states), Cantarero and Pascual [14] find similar results using infant mortality as dependent variable. Similar conclusions are reached for Canada by Jiménez-Rubio [38]. In any case, as stated by Nolte and McKee [53: p. 10], it has to be acknowledged that the general reduction in infant mortality rates and the low level of variation achieved limit the "ability to compare health system performance using mortality data at the aggregate level," with infant mortality being therefore a less than advisable indicator for this type of analysis. For instance, in the case of the works of Cantarero and Pascual [15] and Jiménez-Rubio [38], no regional-specific time trend is included, so it is possible that more decentralized regions would have performed the same without decentralization if they were improving at a different pace than the others. In the Spanish case, for example, the evolution of infant mortality (under 5 years old) in the period 1960–2011 closely follows a logarithmical time trend ($R^2 = 0.98$) with slightly over the fitted function in the first part of the period 1962–1980 and slightly under it from 1980 to 2004 (the same can be said for life expectancy, this time with a linear trend, $R^2 = 0.99$). In other words, the reduction of infant mortality rates in Spain is essentially explained by the time trend. Finally, in their analysis of decentralization of health (from a finance perspective) in three Latin American countries, Arreondo et al. [6] show the existence of strengths and weaknesses that make it difficult to judge decentralization as a success or failure.

¹⁸ In particular, some regions—mainly Madrid—have started to resort to private finance initiatives (PFI) in order to build new hospitals. Although there are no studies for the Spanish case, the British experience with PFI suggests that this strategy is costly and inefficient [28, 35].

¹⁹ For example, the Spanish Agency of Evaluation and Quality (<http://www.aeval.es>) uses the same types of indicators, based on subjective perceptions of and satisfaction with public services, in order to evaluate several programs. See, among many others, the work of Del Pino et al. [23].

the opinion of the users, even if biased, is an important ingredient of health care delivery and should be taken into account by public authorities. This issue is even more relevant if the possibility of adapting health care policy to citizens' preferences drives decentralization. Finally, up to now, there has been hardly any other evidence at all about important aspects of health care such as waiting lists, hospital-acquired infections or cost-effectiveness of medical interventions across Spanish regions. In this respect, there are some policy implications of this research. The main one is the need to give up uncritical positions on decentralization driven by political motivations, taking for granted the benefits or costs of decentralization. It also emphasizes the importance of exerting some extra efforts to compile other types of databases that allow studying the impact of decentralization on several dimensions. In this respect, it should be particularly important to increase the transparency of regions, trying to depoliticize the issue.

Acknowledgments We thank the Centre for Sociological Research (Research Grants 2011 edition). Antón and Fernández Macías also acknowledge financial support from the Spanish Ministry of Science and Innovation (project CSO2010-16413). An earlier version of this article was presented at the *XXXVII Simposium of Economic Analysis* in Vigo (Spain) on 14–16 December 2012. We are grateful for the comments from four anonymous referees that contributed to substantially improving the paper.

Appendix

See Table 7.

Table 7 Descriptive statistics of the variables used in the analysis

	Mean	Standard deviation
Care and assistance received from medical staff	7.50	1.97
Time devoted by physicians to each patient	6.61	2.37
Waiting time for patients before being seen by their physicians at health centers	5.66	2.40
Medical equipment and technology	6.72	2.21
Information received by patients about their health problems	7.15	2.09
Consultation hours	7.18	2.16
Ease of getting appointments	6.77	2.47
Home health care	7.07	2.37
Knowledge of patients' medical history and patient monitoring	7.05	2.24
Proximity of health centers	7.72	2.15
Confidence transmitted by doctors	7.43	2.14
Care and assistance received from nurses	7.30	1.90
Care and assistance received from doctors	7.22	1.92

Table 7 continued

	Mean	Standard deviation
Assistance from non-medical staff	7.07	1.93
Administrative procedures to be admitted to a hospital	6.08	2.28
Waiting time to be admitted in case of a non-urgent health problem	4.26	2.51
Number of people who share a hospital room	5.43	2.48
Medical equipment and technology	7.84	1.74
Information received by patients about their health problems	7.13	1.99
Accommodation and catering	6.43	2.22
Male	0.49	0.50
Female	0.51	0.50
Age	46.04	18.25
Elementary education	0.09	0.29
Basic education	0.47	0.50
Secondary education	0.28	0.45
Higher education	0.16	0.36
Employed	0.46	0.50
Unemployed	0.10	0.29
Retired	0.22	0.42
Other inactive people	0.22	0.42
Andalusia	0.17	0.38
Aragon	0.03	0.17
Asturias	0.03	0.17
Balearic Islands	0.02	0.14
Canary Islands	0.04	0.19
Cantabria	0.01	0.12
Castile-La Mancha	0.04	0.20
Castile and Leon	0.06	0.24
Catalonia	0.16	0.37
Valencian Community	0.10	0.30
Extremadura	0.03	0.16
Galicia	0.07	0.25
Madrid	0.13	0.34
Murcia	0.03	0.16
Navarra	0.01	0.12
Basque Country	0.05	0.23
Rioja	0.01	0.08
Year 1996–1997	0.08	0.28
Year 1998	0.09	0.28
Year 1999	0.08	0.28
Year 2000	0.09	0.28
Year 2001	0.03	0.17
Year 2002	0.03	0.16
Year 2003	0.08	0.28
Year 2004	0.08	0.28
Year 2005	0.08	0.28

Table 7 continued

	Mean	Standard deviation
Year 2006	0.08	0.28
Year 2007	0.08	0.28
Year 2008	0.09	0.28
Year 2009	0.10	0.30
Regional per capita GDP	21,479	5,136
Regional total population	4,395,909	2,511,529
Regional percentage of population aged <16	15.66	2.07
Regional percentage of population aged 65 and over	16.64	2.68
Percentage	5.36	4.63
Socialist regional government	0.43	0.49
Conservative regional government	0.40	0.49
Other regional government	0.17	0.37
Decentralized health care	0.90	0.30
Non-decentralized health care	0.10	0.30
Decentralized 1–5 years ago	0.10	0.31
Decentralized 6–10 years ago	0.15	0.35
Decentralized 11–15 years ago	0.15	0.36
Decentralized More than 15 years ago	0.49	0.50

Source: Authors' analysis from Health Barometer micro-data

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