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Kyriacou, Andreas; Roca i Sagalés, Oriol. «Fiscal decentralization and health care access and quality : evidence from local governments around the world». *Publius*, Vol. 54, Num. 2 (2024), p. 313-338 DOI 10.1093/publius/pjad049

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***This is a postprint version of the article*: Kyriacou, A.P. and Roca Sagalés, O. 2024, "Fiscal Decentralization and Health Care Access and Quality: Evidence from Local Governments Around the World", Publius: The Journal of Federalism, vol. 54(2), pp. 313-338. DOI: 10.1093/publius/pjad049.**

# Fiscal Decentralization and Health Care Access and Quality: Evidence from Local Governments Around the World

## Abstract

In this article we consider how decentralizing health spending down to local governments impacts on health care access and quality. Based on data from 49 countries around the world over the period 1996-2015, we find that decentralizing health spending is inimical to timely and effective health care. We moreover explore the role of two specific channels through which fiscal decentralization can undermine health outcomes namely, externalities and foregone economies of scale. We find that decentralizing health expenditure down to the local level may generate externalities to the detriment of health outcomes when it is accompanied by locally elected municipal politicians who are not subject to national parties. Our results also suggest that fiscal decentralization can improve health access and quality when approximately two-thirds or more of the people in a country live in localities with more than 300,000 inhabitants, implying that below this threshold economies of scale may be foregone.

## Key words

Fiscal decentralization, health decentralization, health care access and quality, local governments, economies of scale, externalities

## JEL codes

H11, H72, I18

Theoretically, fiscally decentralizing public health policy may improve health outcomes for a range of reasons. In a decentralized setting, mobile citizens can sort themselves across political jurisdictions according to their preferred level, quality, and price for public services. This matching of the demand for services with their supply is expected to enhance social welfare (Tiebout 1956). Moreover, mobile citizens and capital can generate inter-jurisdictional competition for fiscal resources thus pushing sub-central governments to provide public health services more efficiently (Brennan and Buchanan 1980). The decentralization of public policies can be beneficial even when mobility is limited. First, the greater proximity between service providers and users implies that there is more information on both the demand and supply sides of public services (Oates 1972; Seabright 1996), including health services (Hurley, Birch, and Eyles 1995). Second, citizens can use the performance of sub-central governments in neighboring or comparable jurisdictions as a benchmark for the performance of their own governments – a concept known as yardstick competition (Besley and Case 1995; Salmon 1987). Third, decentralization allows for welfare improving innovations to emerge in one jurisdiction and, from there, to spread across the country (see, Hayek 1937 and Oates 1999 for the general argument and, again, Hurley, Birch, and Eyles 1995 for the particular case of health services).

Decentralization can also lead to the inefficient provision of health services to the detriment of health outcomes. The inter-jurisdictional competition for fiscal resources can potentially lead to reduced tax pressure thus undermining the capacity of sub-central governments to effectively provide public services (Keen and Marchand 1997). In the absence of suitably designed and funded fiscal transfers, decentralizing down to jurisdictions with unequal revenue raising capacities can also generate inequalities in

fiscal resources and, ultimate, inequalities in health services and outcomes across jurisdictions (for the general argument see Prud'homme 1995 and for health inequalities see, Collins and Green 1994, and Sumah, Baatiema, and Abimbola 2016). In addition, fiscal decentralization may create inefficiencies if the public goods or services provided, experience externalities or economies of scale (Oates 1972). This could certainly be relevant for health services. For example, externalities or spillovers may emerge in the case of immunization policies when the benefits of immunization services extend beyond the borders of a subcentral jurisdiction. The decentralization of these services may lead to them being under-provided as jurisdictions free-ride on the provision of these services by others (Costa-i-Font 2012; Khaleghian 2004). Economies of scale in health service delivery can take several forms. Cost savings can emerge because the centralized buying of drugs and medical equipment can increase the bargaining power of the public sector when dealing with private sector suppliers (Jiménez-Rubio 2011a). Moreover, the per capita cost of medical technologies with high sunk costs will be lower if these are financed at more centralized levels, at the same time as the access of a larger share of the population to such technologies at these levels reduces the risk that they are underutilized (for example, MRI devices or CAT scanners) (Kyriacou and Roca-Sagalés 2019).

Existing empirical evidence regarding the impact of fiscal decentralization on health outcomes has mostly come out in favor of a positive effect, although there is also some evidence of negative or insignificant effects (for surveys see Channa and Faguet 2016, Dwicaksono and Fox 2018, and Martinez-Vazquez, Lago-Peñas, and Sacchi 2017). As can be appreciated in the on-line Appendix Table OA.1, previous work differs on a range of dimensions including, on the one hand, the indicators employed to measure health

outcomes and fiscal decentralization and, on the other, the units of analysis. Health outcomes have mostly been measured by way of infant mortality rates (Arends 2017; Asfaw et al. 2007; Cantarero and Pascual 2008; Cavalieri and Ferrante 2016; Enikolopov and Zhuravskaya 2007; Habibi et al. 2003; Jiménez-Rubio 2011a,b; Jiménez-Rubio and Garcia-Gómez 2017; Jin and Sun 2011; Robalino, Picazo, and Voetberg 2001; Rocha, Fernandez-Orellano, and Nishijima 2016; Soto, Farfan, and Lorant 2012; Uchimura and Jutting 2009). Another group has measured health outcomes based on self-reported satisfaction with public health care (Antón et al. 2014; Diaz-Serrano and Rodríguez-Pose 2015; Espasa, Esteller-Moré, and Mora 2017; Huang et al. 2017) or the quality of public services more generally (Kyriacou and Roca-Sagalés 2019). Health outcomes have also been measured in terms of immunization coverage rates (Enikolopov and Zhuravskaya 2007; Khaleghian 2004), life expectancy at birth (Cantarero and Pascual 2008; Montero-Granados, Jiménez and Martín 2007), change in the poor population covered by public health insurance (Faguet and Sánchez 2014), public health expenditure (Arends 2017; Arze de Granado, Martinez-Vazquez, and McNab 2018) and efficiency scores generated by Data Envelopment Analysis or Stochastic Frontier Models and employing infant mortality rates as output variables (Adam, Delis, and Kammas 2014; Arends 2017; Porcelli 2014).

Fiscal decentralization has also been measured in different ways. Most cross-country studies employ aggregate indicators capturing sub-central (regional and/or local) government spending or revenue as a percentage of total spending or revenue (Adam, Delis, and Kammas 2014; Arends 2017; Arze de Granado, Martinez-Vazquez, and McNab 2018; Diaz-Serrano and Rodriguez-Pose 2015; Enikolopov and Zhuravskaya 2007; Jiménez-Rubio 2011b; Khaleghian 2004; Robalino, Picazo, and Voetberg 2001). Two

cross-country studies use a more focused measure of fiscal decentralization namely regional and/or local public health expenditure as a share of total health expenditure (Arends 2017; Kyriacou and Roca-Sagalés 2019). This more focused approach has also been adopted by some of the country-specific analyses of the impact of fiscal decentralization on health outcomes. Specifically, studies exploiting within-country variation of fiscal decentralization have tended to measure decentralization as public health expenditures by lower levels (local, county, provincial, regional) as a share of the health expenditures of higher levels (provincial, regional, or national) (Cantarero and Pascual 2008; Jiménez-Rubio 2011a; Soto, Farfan, and Lorant 2012).

Insofar as the samples employed, of the 26 studies reviewed in the on-line Appendix Table OA.1, 17 exploit evidence from specific countries namely, Argentina (Habibi et al. 2003), India (Asfaw et al. 2007), Spain (Antón et al. 2014; Cantarero and Pascual 2008; Espasa, Esteller-Moré, and Mora 2017; Jiménez-Rubio and Garcia-Gómez 2017; Montero-Granados, Jiménez and Martín 2007), China (Huang et al. 2017; Jin and Sun 2011; Uchimura and Jutting 2009), Canada (Jiménez-Rubio 2011a), Colombia (Faguet and Sánchez 2014; Soto, Farfan, and Lorant 2012), Italy (Cavalieri and Ferrante 2016; Di Novi al. 2019; Porcelli 2014) and Brazil (Rocha, Fernandez-Orellano, and Nishijima 2016). The 9 remaining studies are cross-country in nature. These can be broadly divided into two groups. First, studies that exploit evidence from a large number – between 42 to 140 – of developing, transition and/or developed countries (Arze de Granado, Martinez-Vazquez, and McNab 2018; Enikolopov and Zhuravaskaya 2007; Khaleghian 2004; Robalino, Picazo, and Voetberg 2001). Second, based on a group of – 20 to 32 – OECD or European countries (OECD: Adam, Delis, and Kammas 2014; Jiménez-Rubio 2011b; European: Arends 2017; Diaz-Serrano and Rodríguez-Pose 2015; Kyriacou and Roca-

Sagalés 2019). Generally, cross-country studies that include a relatively large number of countries tend to measure fiscal decentralization as sub-central government spending or revenue as a share of total public spending or revenue since this data is more widely available. Studies centered on OECD countries go a step further by focusing on sub-central governments' own revenues – revenue sources controlled by sub-central governments, – as a share of total government revenues (Adam, Delis, and Kammas 2014; Jiménez-Rubio 2011b). As previously stated, Arends (2017) and Kyriacou and Roca-Sagalés (2019) are the only cross-country studies employing sub-central public health expenditure as share of total public health expenditure to measure fiscal decentralization. The former covers up to 25 European countries while the latter extends to 30 countries across Europe.

In this article we will follow this last set of contributions by employing fiscal decentralization measures that account for local government health spending as share of total spending on public health. We will go beyond this work in several ways. First, our country sample includes 49 countries and covers developing, transition and developed countries across the world. Second, we will consider how fiscal decentralization affects health outcomes by way of a health indicator that is based on the concept of amenable mortality that reflects the rates of death considered preventable by timely and effective care. As will be more fully explained below, empirically considering the impact of fiscal decentralization on outcomes such as infant mortality, immunization coverage or life expectancy, may be difficult given that such outcomes may depend on many factors beyond the influence of health policy. Alternatively, the timeliness and effectiveness of health care is potentially more directly influenced by health policy design, which includes the degree of decentralization of

health expenditure. Third, we will empirically explore the theoretical arguments suggesting that externalities or spillover effects and economies of scale may affect the impact of fiscal decentralization on health outcomes. To the best of our knowledge, these interaction effects have yet to be empirically examined. Our empirical evidence from a sample of 49 countries over the period 1996 to 2015 are strongly suggestive of the view that decentralizing health expenditure down to the municipal level has a negative impact on health care outcomes. Moreover, we find that fiscal decentralization can improve health outcomes when around two-thirds or more of the people in a country live in localities with more than 300,000 inhabitants suggesting a role for economies of scale. Finally, we find some support for the idea that fiscal decentralization may worsen health outcomes in the context of locally elected politicians who are not subject to national party discipline, because it gives rise to externalities or spillover effects.

## DATA AND EMPIRICAL METHODOLOGY

Our main measure of health care system performance is the Healthcare Access and Quality (HAQ) index (Murray et al. 2017). This index is based on the concept of amenable mortality that reflects the rates of death considered preventable by timely and effective care. Specifically, it uses age-standardized and risk-standardized mortality rates for 32 causes of death that timely and effective health care could potentially prevent. The HAQ index is scaled from zero to 100 and is increasing with lower mortality rates for causes amenable to health care, thus reflecting better access to, and quality of, care. In our sample of countries, it ranges from 44.70 to 93.60 with a mean value of 77.56. Countries on the low end include Indonesia, South Africa, and Mongolia, those around the mean

include Croatia, Poland, and Hungary, and the countries with the lowest amenable mortality rates are Iceland, Switzerland, and Sweden. The HAQ index is available every five years between 1990 and 2015.

As stated in the Introduction, much of previous work has focused on the impact of fiscal decentralization on mortality rates and life expectancy, both of which are based on infant mortality rates (see full definitions of these and all the variables employed in this article in the on-line Appendix Table OA.2). The difficulty with such "raw" mortality-based indicators is that they can be affected by many other factors above and beyond the design of fiscal policy. For example, writing on life expectancy, Lewer and Bibby (2021, e623) explain that it is "the result of the social and economic history of the past century—the prevalence of smoking, treatment for cardiovascular diseases, road safety, housing quality, safety of childbirth, and many other social changes." Ideally, studies examining the impact of fiscal decentralization on "raw" mortality-based indicators should account for such factors which is certainly a challenging task. This problem is mitigated when using a health indicator based on the concept of amenable mortality and that reflects the timeliness and effectiveness of health care, since these attributes are more likely to be directly impacted on by health policy design of which fiscal decentralization in the health sector is one dimension. This said, in an effort to relate our work to existing work, we also explore the extent to which decentralizing health spending down to local governments impacts on life expectancy and infant and child mortality rates.

To measure fiscal decentralization in the health sector we turn to the IMF's Fiscal decentralization dataset that covers a range of fiscal decentralization indicators (LLedó

et al. 2018). We focus on variable health_lg, defined as local health expenditure as a share of general government health expenditure. This variable is available annually from 1995 to 2016. Given the availability of the HAQ index, we average the fiscal decentralization measures coincident to four five-year periods starting in 1996 and ending in 2015 (1996-2000, 2001-05, 2006-10, 2011-15). We match these averages to the corresponding value of the HAQ index at the end of each five-year period thus allowing fiscal policy to impact on health outcomes with a lag of up to four years. We apply the same approach to all the time variant variables employed in the empirical analysis. Of course, this reduces the number of observations compared to an analysis based on yearly data, but this approach is taken due to the temporal availability of the HAQ index which is our main dependent variable. The degree of fiscal decentralization of health spending ranges widely in our sample of countries, from zero to 98.58 percent. Local governments spend nothing on health in countries such as Cyprus, Malta, and New Zealand while they undertake almost all the spending in this area in Denmark, Italy and Sweden. The mean percentage of fiscal decentralization in health down to local governments is 27.03 and the country closest to this is Hungary.

Figure 1 about here

The overlap between these two variables and a set of control variables (explained below) leads to a sample of up to 49 countries over the period 1996 to 2015. Figure 1 shows the differences across these countries in both the HAQ and fiscal decentralization indices, taking average values of each variable over the sample period (see Appendix Table A.1 for full country names).

We estimate the following empirical model:

$$\text{Health Outcome}_{it} = \beta_0 + \beta_1 \text{LDHealth}_{it} + \beta_2 X_{it} + \mu_t + \varepsilon_{it} \quad (1)$$

Where i and t refer to countries and time-periods respectively, the Health Outcome is the dependent variable, LDHealth is decentralization of health expenditure down to the local level, X is a vector of control variables and ε an error term. Our main health outcome variable is the HAQ index, but we also consider three variables related to life expectancy (life expectancy at birth, healthy life expectancy at birth and healthy life expectancy at 60) and two mortality variables (infant and child mortality). This model is estimated by way of OLS based on panel corrected standard errors (PCSE) that are robust to heteroscedasticity and serial correlation between the residuals of a given cross-section (Period SUR). We include period fixed effects ($\mu_t$), to account for the impact of time varying factors common to all countries. To account for the influence of time constant factors specific to each country, country fixed effects would be used. However, we do not include these because of the limited within-country variation compared to the cross-section variance in our key variables of interest. Thus, as can be appreciated in Table A.2 in the Appendix, the within standard deviation of the HAQ index is 2.98, compared to a between standard deviation of 10.97. In the case of the local decentralization of health spending the corresponding numbers are 0.10 versus 0.32.

Our choice of control variables is inspired by previous work and is ultimately guided by the need to reduce omitted variable bias. We control for GDP per capita, to capture a range of unobserved factors impacting on health outcomes that may depend on economic development. We measure this variable in constant USD and PPP terms to take into account the differences in the cost of living. Previous work has related greater wealth per capita with better health outcomes (see, for example, Filmer and Pritchett

1999; Pritchett and Summers 1996). GDP per capita is a potentially important control in our heterogeneous sample that includes developing, transition and developed countries, as attested by values ranging from $4,394 corresponding to Mongolia in the period 1996-2000 to $109,757 for Luxembourg over 2011-2015. We account for population size as a proxy of the size of the country because smaller countries tend to be more centralized (Panizza 1999). We control for interpersonal income inequality given the results of Pickett and Wilkinson (2009) showing the benefits from greater equality in terms of a range of physical and mental health dimensions including, infant mortality, life expectancy, mental illness, drug use, and obesity. We control for the extent to which the country is ethnically fractionalized since ethnic heterogeneity can undermine consensus regarding public goods provision (Alesina, Baqir, and Easterly 1999) at the same time as it can be an important driver of decentralization (Arzaghi and Henderson 2005; Panizza 1999). The level of democracy is another potentially confounding covariate since previous work has reported that democracy improves health outcomes, for instance, by reducing infant and child mortality (Gerring, Thacker, and Alfaro 2012; Pieters et al. 2016; Wang, Mechkova, and Andersson 2019; Wigley and Akkoyunlu-Wigley 2017). Democracy could also be conducive towards greater decentralization (Alesina and Spolaore 2003; Arzaghi and Henderson 2005; Panizza 1999). We also include total health expenditure per capita (public and private) to account for the possibility that such spending may positively affect health outcomes (see Anyanwu and Erhijakpor 2009; Nixon and Ulman 2006; Novignon, Olakojo, and Nonvignon 2012). Moreover, because health spending is also undertaken by regional governments in 6 out of 49 countries in our sample – Australia, Austria, Russia, South Africa, Spain, and Switzerland, – we control for this spending as a share of total health

expenditures. We control for governance quality because it has been identified as a potential determinant of better health outcomes (see, for example, Gupta, Davoodi, and Tiongson 2002 and more recently Li et al. 2018) as well as a possible moderator of the impact of decentralized health spending on health outputs (Nakatani, Zhang, and Garcia-Valdes 2023). Finally, we control for local tax autonomy as a proxy for local government decision-making autonomy. Fiscal decentralization, as we measure it here, may not necessarily reflect the ability of local governments to decide health policy due to restrictions or regulations established at the national level including "earmarked grants, mandatory spending and national standards" (Beazley et al. 2019; p 16).

## EMPIRICAL RESULTS

Column 1 of Table 1 presents the estimation of equation 1 as described in the previous section. Decentralizing health expenditure down to the local level has a clear negative impact on health care access and quality. The result is both statistically and economically significant. A one standard deviation increase in the degree of fiscal decentralization reduces the HAQ index by 1.77 points or 16.61 percent of a standard deviation of this measure. The negative effect of decentralizing health expenditure also emerges when employing alternative measures of health outcomes namely, life expectancy (also in terms of healthy life expectancy) and mortality (both infant and child mortality). Overall, these results suggest that when decentralizing health spending down to the local level, the expected negative effects of fiscal decentralization in the guise of reduced and unequally distributed fiscal resources, foregone economies of scale, and spillover effects, tend to outweigh the expected positive effects due to sorting and competition, information advantages and innovations. These results are in line with those reported

by previous cross-country work that has focused on the decentralization of health expenditure (Arends 2017; Kyriacou and Roca-Sagalés 2019).

Table 1 about here

Before further exploring these findings, a word also about the estimated effect of the control variables. We find a robust negative impact of income inequality and ethnic fractionalization on health outcomes and some evidence that GDP per capita, population size, health expenditure per capita, governance quality and local tax autonomy improve health outcomes. GDP per capita is found to improve health outcomes but its effect is only statistically significant in the last two regressions of Table 1. One reason for this could be that it is highly correlated with per capita health spending as indicated by a pairwise correlation of 0.953 (p-value is zero). Indeed, when we drop the per capita health expenditure variable from the models, GDP per capita becomes statistically significant in all regressions. We do not find the level of democracy to be associated with health outcomes in our sample. When we interact decentralized health expenditure-local with governance quality to explore the possibility of a moderating effect, we do not find the interaction term to be statistically significant (all estimates mentioned here but not shown are, of course, available upon request).

In Table 2 we conduct an interaction analysis employing variables that can help identify the economies of scale and spillover effects channels through which fiscal decentralization may undermine health outcomes. In columns 1 to 5 we focus on economies of scale, and we deal with spillover or externality effects in columns 6 to 9. Specifically, we capture the role of economies of scale considering two different urbanization variables referring to the share of population living in cities above specific

population thresholds: urban_50 that defines this threshold as at least 50,000 inhabitants (Florczyk et al. 2019), and urban_300 that uses a threshold of at least 300,000 inhabitants (UN 2018). The intuition here is that in countries where a greater share of the population resides in larger municipalities, economies of scale in the form of a greater negotiating strength when purchasing drugs and medical equipment, a reduced per capita cost of medical technology with high sunk costs, and higher utilization rates, are more likely to emerge in decentralized settings. Our approach is inspired by the standard method employed by empirical work that attempts to capture economies of scale in service provision by local governments, and that does so using cross-municipal differences in population size (Andrews and Boyne 2009; Tran, Kortt, and Dollery 2019). We approximate this approach at the country level by exploiting cross-country differences in the share of population living in cities of different size thresholds as captured by the available indicators.

Interestingly, the first urban variable is not significant, while the second one is (columns 1 and 3), indicating that health access and quality is higher in countries with a higher share of the population living in larger municipalities. In columns 2 and 4 we interact both urban indicators with our variable of interest to consider their potential moderating effect. Again, the interaction with urban_50 is not statistically relevant, while the interaction with urban_300 is positive and statistically significant, suggesting that local health decentralization will improve health outcomes in countries with a higher percentage of population living in relatively large urban areas. Specifically, the threshold value of urban_300 which changes the estimated effect of local health decentralization from negative to positive is 64 percent. In other words, the marginal effect of local health decentralization on health outcomes becomes positive in countries

where approximately two thirds or more of the population live in urban areas of more than 300,000 inhabitants. Decentralizing health expenditures down to the local level in these countries can still harness economies of scale to the benefit of health care access and quality.

This interpretation is supported by the fact that we always control for a country's population size. This accounts for the possibility that the share of people living in cities of more than 300 thousand people simply picks up total population differences across countries – more populous countries have a higher share of population living in bigger cities, – and a higher population may relate to decentralization and health quality for other, unrelated reasons. But beyond population size, this result is maintained after additionally controlling, in column 5, for population density given the possibility that the urbanization variable is picking up density differences and because distance from health centers (as proxied by population density) can affect patient access to health care (Hanlon et al. 2012). In our sample of 49 countries, there are 8 countries with more than two thirds of their population living in this kind of urban areas (Australia, China, Israel, Japan, Mongolia, South Africa, Thailand, and Turkey). In the remaining 41 countries, decentralizing health expenditure down to the local level potentially foregoes economies of scale, to the detriment of health access and quality. Our results help inform a previous, unsubstantiated claim that the optimal size of a decentralized jurisdiction in the health sector could be "a geographically compact area of 50,000-500,000 people, often a local government unit, which can provide a comprehensive health service for most conditions." (Mills 1994, 284; see also WHO 1988).

Table 2 about here

We next examine the role played by spillovers or externalities considering two different variables from Hankla, Martinez-Vazquez, and Ponce-Rodriguez (2019) that reflect the extent of democratic decentralization and party integration and that focus on the municipal level. These authors argue that democratic decentralization in the form of locally elected municipal governments increases democratic accountability and, as a result, can contribute towards the efficient provision of local public goods. Moreover, and importantly for our purposes here, integrated party systems imply that subnational elections are contested by national parties, and these have an incentive to internalize the positive or negative spillovers of local policies on other localities and, by controlling their access to the ballot, influence locally elected members to do the same. The willingness of local politicians to be responsive to national party wishes is increased if they desire to move up within their parties and acquire national office (for the original argument see Riker 1964 and for a previous discussion see Enikolopov and Zhuravaskaya 2007).

The two dichotomous variables are labelled DemDecPartyInt and DemDecPartyNonInt for democratic decentralization and party integration or non-integration respectively. The residual category in both cases is the absence of municipal elections. Columns 6 and 7 indicate a positive association between democratic decentralization and party integration on the one hand and health care access and quality on the other. In the case of democratic decentralization and party non-integration (columns 8 and 9) we find the association to be negative but only statistically significant in one of the models (column 8). Our results are consistent with those reported by Hankla, Martinez-Vazquez, and Ponce-Rodriguez (2019) who regress a range of health variables – including child immunization, TB detection and treatment rates and infant mortality rates – against

these measures. They find that democratic decentralization combined with party integration generally has a positive effect on health outcomes while the non-integration variant's positive effect is generally weaker, sometimes not statistically significant, and sometimes the effect is negative. More relevant for our purposes are the interaction effects reported in columns 7 and 9. While combining fiscal decentralization with democratic decentralization and integrated party systems has no effect on health outcomes, fiscal decentralization in democratically decentralized countries where moreover parties are not integrated, has a clear negative impact on health care access and quality. This result is consistent with the idea that non-integrated municipal parties have little incentive to internalize spillover effects and, as such, is supportive of the argument that fiscal decentralization may worsen health outcomes because it can generate externalities. It is important to note that controlling for governance quality is especially relevant here. According to Enikolopov and Zhuravaskaya (2007), strong national parties could also create incentives to resist local special interests who may target (capture) the resources available in decentralized settings. Thus, if we didn't control for governance, the estimated negative interaction effect of party non-integration on health could be driven more by capture rather than spillover effects. The negative interaction effect of democratic decentralization combined with party non-integration is maintained after controlling for governance quality, suggesting the importance of spillovers.

Table 3 about here

In Table 3 we explore the robustness of the estimated negative impact of fiscal decentralization on health care access and quality. In the first two columns, we include

two indicators from Ladner, Keuffer, and Baldersheim (2016) that capture the extent to which local governments are autonomous with regards to health policy. Again, decentralized health expenditure does not necessarily imply the capacity of sub-central units to freely decide on health policy and as such controlling for the degree of autonomy in this area is useful. Unfortunately, this data is only available for European countries (we identify these countries in Appendix Table A.1). In column 1 of Table 3 we include the variable named 'local policy scope in health' that captures the extent to which local governments are *formally* autonomous when taking decisions related to primary health services, the construction and maintenance of health centers, and doctors' employment and payment. Column 2 includes the variable 'local effective political discretion in health' that captures the extent to which local government has *real* influence (can decide on service aspects) over primary health services, the construction and/or the maintenance of health centers, and the organization and functioning of specialized health centers. The inclusion of these qualitative indicators of health policy autonomy does not change the estimated negative impact of health expenditure decentralization on health care access and quality.

In columns 3 to 6 we control for a set of additional fiscal variables that can account for the degree of fiscal autonomy at the municipal level and thus reduce the danger that the health expenditure decentralization variable that we employ may, again, misrepresent the degree of autonomy enjoyed by local governments when deciding on health policy. Specifically, in column 3 we account for revenue decentralization (ratio of own revenues to general government revenues) which, unsurprisingly is strongly correlated with local tax autonomy (correlation 0.933 with a p-value of zero) and so we drop the latter when including the former. In columns 4, 5 and 6 we respectively control

for the ratio of net transfers to local government to own spending (local transfer dependence), 1 minus the ratio of own revenue to own spending (local vertical fiscal imbalance), and a variable capturing the extent to which transfers are conditional or unconditional (local transfer conditionality). The inclusion of these variables does not alter our main results: decentralizing health expenditure down to the local level has a negative impact on health care access and quality.

We finally examine the sensitivity of our main finding when controlling for membership of the European Union (EU), the transition from a communist to a capitalist system, and government size. We control for membership of the EU since EU laws, policies and fiscal rules may have an impact on public health spending. Controlling for transition economies is due to work that has pointed to significant increases in communicable diseases (mainly HIV and tuberculosis) in such countries (Bankauskaite and Saltman 2007). Finally, we control for the size of government defined as government expenditures as share of GDP to consider the possibility that the size of the public sector can be associated with health care access and quality for reasons unaccounted for by the fiscal variables employed in the regressions. Our main result is maintained: decentralizing health expenditures down to the local level has a negative effect on health.

## CONCLUSION

In this article we have considered the impact of fiscal decentralization on health care access and quality based on a cross-country sample covering 49 developed, transition and developing countries over the period 1996 to 2015. To measure fiscal decentralization, we have employed an indicator that reflects local government health

spending as share of total spending on public health. To measure health access and quality we have employed an indicator that reflects the rates of death considered preventable by timely and effective care. Our empirical evidence suggests that decentralizing public health expenditure down to the local level has a negative effect on health care access and quality. As such it indicates that the expected negative effects of fiscal decentralization in the form of reduced and unequally distributed fiscal resources, foregone economies of scale, and externalities or spillover effects, tend to outweigh the expected benefits due to sorting and competition, information advantages and innovations.

We moreover strive to unravel some of the channels through which fiscal decentralization may undermine health outcomes, namely economies of scale and spillover effects. We find that fiscal decentralization can improve health access and quality when approximately two-thirds or more of the people in a country live in localities with more than 300,000 inhabitants. Decentralizing health expenditures down to the local level in such settings can still harness economies of scale to the benefit of health care outcomes. Interestingly, this implies that decentralizing health policy down to localities may become increasingly feasible in the future since the UN Population Division (UN 2018) forecasts that in 2030, 61.9 percent of the world's population will live in urban areas with more than 300,000 inhabitants – a percentage that has been increasing over the last decades (from 49.9 percent in 1990 to 58.5 percent in 2018). Our empirical results also indicate that fiscal decentralization combined with locally elected municipal politicians who are not subject to national parties (non-integrated party systems) may worsen health outcomes. This is consistent with the presence of externalities in decentralized settings because local politicians in such systems have little

incentive to internalize spillover effects. Alternatively, positive or negative externalities may be internalized in the presence of integrated party systems since national parties will pressure local politicians to take them into account.

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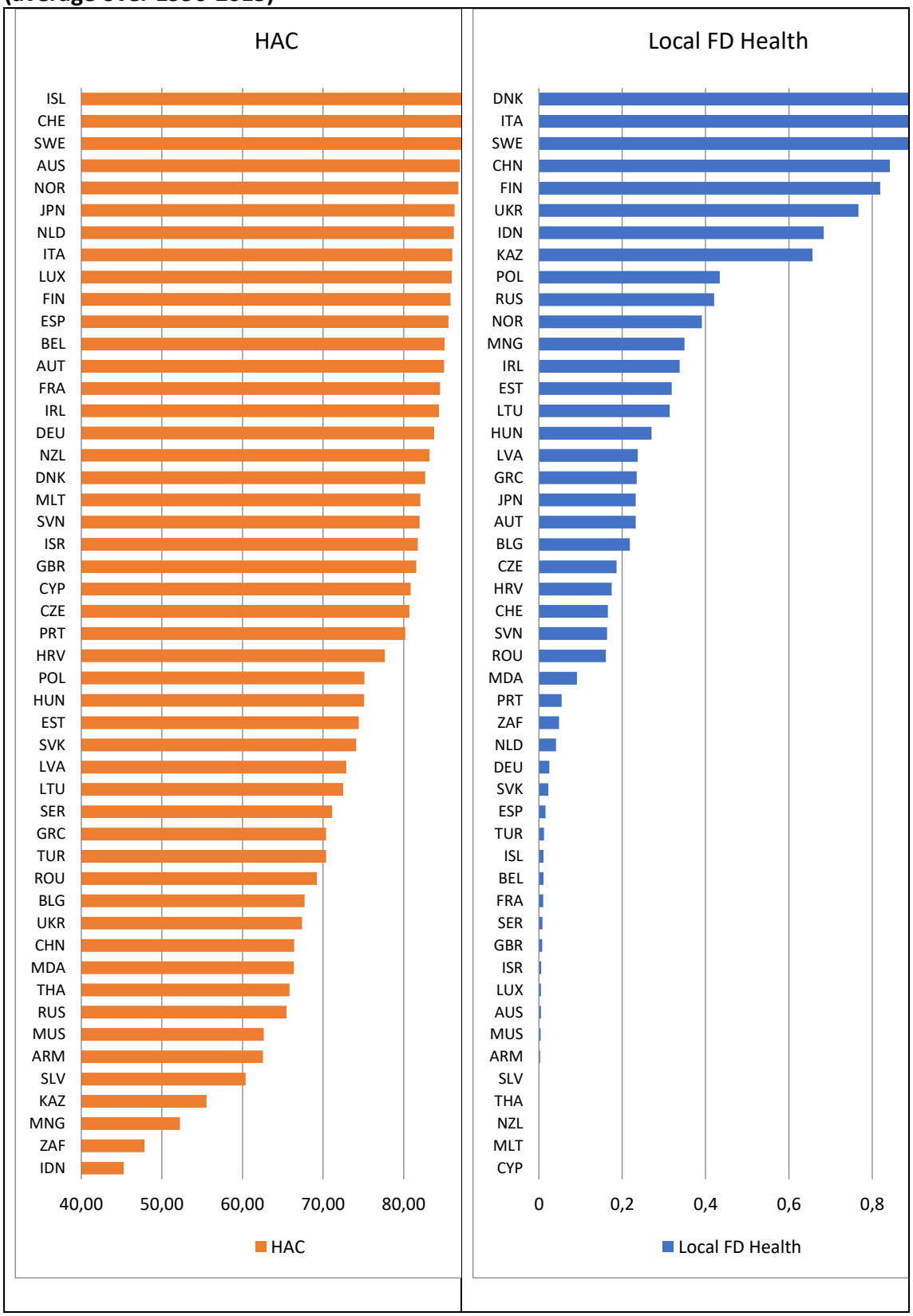
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**Figures and tables to be inserted in the text**

**Figure 1. Health Care Access and Quality and Decentralization of Health Spending (average over 1996-2015)**




*Notes*: Elaborated based on data from Murray et al. (2017) and Lledó et al. (2018).

**Table 1 – Local decentralisation on health spending and health outcomes**

| Dependent variable: | HAQ | Life Expectancy | HALE at birth | HALE at 60 | Infant Mortality | Child Mortality |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Dec. of health spending - local | -5.322** | -2.629** | -2.579** | -1.259*** | 0.274* | 0.266* |
| | (2.045) | (1.306) | (1.114) | (0.471) | (0.149) | (0.140) |
| Log of per capita GDP (PPP) | 4.694 | 1.962 | 2.089 | 0.535 | -0.493** | -0.559*** |
| | (2.949) | (1.885) | (1.599) | (0.682) | (0.215) | (0.202) |
| Log of population | 0.356 | 0.514** | 0.457** | 0.151 | -0.006 | -0.007 |
| | (0.401) | (0.257) | (0.218) | (0.093) | (0.029) | (0.028) |
| Income inequality | -0.383*** | -0.230*** | -0.194*** | 0.004 | 0.023** | 0.026*** |
| | (0.129) | (0.083) | (0.070) | (0.030) | (0.009) | (0.009) |
| Ethnical fractionalisation | -5.779* | -3.486* | -3.832** | -1.593** | 0.391* | 0.387* |
| | (3.123) | (1.996) | (1.698) | (0.725) | (0.229) | (0.215) |
| Democracy | 0.147 | 0.023 | -0.006 | -0.003 | -0.021 | -0.020 |
| | (0.208) | (0.134) | (0.113) | (0.048) | (0.015) | (0.014) |
| Log of per capita | 3.079* | 0.527 | 0.004 | 0.586 | -0.130 | -0.108 |
| Health expenditure | (1.815) | (1.150) | (0.981) | (0.422) | (0.133) | (0.124) |
| Dec. of health spending - state | 1.036 | -0.796 | -1.326 | -0.212 | 0.169 | 0.145 |
| | (3.270) | (2.089) | (1.778) | (0.761) | (0.238) | (0.224) |
| Local tax autonomy | 11.712* | 0.961 | 1.464 | 1.446 | -0.989** | -0.859** |
| | (6.255) | (3.994) | (3.394) | (1.445) | (0.453) | (0.426) |
| Governance quality | 0.172 | 0.447* | 0.364 | 0.162* | 0.004 | 0.007 |
| | (0.416) | (0.266) | (0.226) | (0.097) | (0.030) | (0.028) |
| *Constant* | *13.295* | *51.484**** | *44.841**** | *4.083* | *7.186**** | *7.847**** |
| | *(23.850)* | *(15.301)* | *(12.977)* | *(5.507)* | *(1.737)* | *(1.631)* |
| Adjusted $R^2$ | 0.854 | 0.764 | 0.734 | 0.775 | 0.827 | 0.852 |
| Countries | 49 | 49 | 49 | 49 | 49 | 49 |
| Observations | 166 | 166 | 165 | 165 | 166 | 166 |

*Notes:* All regressions report period SUR panel corrected standard errors in parentheses and include period fixed effects. *, **, *** measures statistical significance at the 10, 5 and 1 percent levels respectively.

**Table 2 – The interaction effects: Economies of scale and externalities**

| Dependent variable: HAQ | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 | Model 9 |
|---|---|---|---|---|---|---|---|---|---|
| Dec. of health spending – local (LFD_health) | -4.615**<br>(2.042) | -0.250<br>(6.349) | -5.425***<br>(1.898) | -12.350***<br>(3.733) | -11.862***<br>(3.876) | -6.094***<br>(2.076) | -6.030**<br>(2.886) | -6.114***<br>(2.016) | -4.175*<br>(2.237) |
| Log of per capita GDP PPP | 4.801*<br>(2.887) | 5.354*<br>(2.966) | 6.674**<br>(2.789) | 5.809**<br>(2.670) | 5.732**<br>(2.688) | 5.993*<br>(3.184) | 5.993*<br>(3.195) | 6.802**<br>(3.081) | 7.792**<br>(2.991) |
| Log of population | 0.320<br>(0.393) | 0.433<br>(0.426) | -0.179<br>(0.414) | -0.153<br>(0.393) | -0.216<br>(0.421) | 0.651<br>(0.460) | 0.650<br>(0.463) | 0.512<br>(0.444) | 0.469<br>(0.423) |
| Income inequality | -0.436***<br>(0.132) | -0.439***<br>(0.133) | -0.530***<br>(0.128) | -0.566***<br>(0.122) | -0.568***<br>(0.122) | -0.385***<br>(0.130) | -0.385***<br>(0.131) | -0.364***<br>(0.126) | -0.346***<br>(0.121) |
| Ethnical fractionalisation | -5.153*<br>(3.074) | -4.631<br>(3.208) | -8.880***<br>(3.015) | -7.834***<br>(2.906) | -7.609**<br>(2.955) | -2.930<br>(3.269) | -2.921<br>(3.288) | -2.143<br>(3.210) | -2.298<br>(3.053) |
| Democracy | 0.185<br>(0.206) | 0.199<br>(0.207) | 0.188<br>(0.193) | 0.209<br>(0.183) | 0.190<br>(0.188) | 0.084<br>(0.208) | 0.085<br>(0.213) | 0.164<br>(0.198) | 0.148<br>(0.188) |
| Log of per capita health expenditure | 3.056*<br>(1.780) | 2.873<br>(1.795) | 1.150<br>(1.752) | 1.428<br>(1.673) | 1.466<br>(1.681) | 2.394<br>(1.810) | 2.398<br>(1.825) | 2.439<br>(1.757) | 2.080<br>(1.687) |
| Dec. of health spending - state | 1.039<br>(3.202) | 0.661<br>(3.271) | 2.554<br>(3.040) | 2.549<br>(2.880) | 2.742<br>(2.930) | -0.383<br>(3.246) | -0.386<br>(3.258) | -0.373<br>(3.150) | -0.455<br>(2.997) |
| Governance quality | 0.118<br>(0.410) | 0.043<br>(0.421) | 0.236<br>(0.384) | 0.385<br>(0.367) | 0.387<br>(0.370) | 0.396<br>(0.417) | 0.395<br>(0.419) | 0.222<br>(0.396) | 0.103<br>(0.381) |
| Local tax autonomy | 11.557*<br>(6.122) | 11.581*<br>(6.137) | 11.117*<br>(5.791) | 10.303*<br>(5.512) | 10.686*<br>(5.584) | 12.085*<br>(6.552) | 12.081*<br>(6.573) | 13.129**<br>(6.365) | 13.151**<br>(6.089) |
| Urban_50 | 0.066<br>(0.047) | 0.088<br>(0.057) | --- | --- | --- | --- | --- | --- | --- |
| Urban_50* LFD_health | --- | -0.136<br>(0.184) | --- | --- | --- | --- | --- | --- | --- |
| Urban_300 | --- | --- | 0.094***<br>(0.032) | 0.072**<br>(0.032) | 0.074**<br>(0.033) | --- | --- | --- | --- |
| Urban_300* LFD_health | --- | --- | --- | 0.192**<br>(0.089) | 0.184**<br>(0.090) | --- | --- | --- | --- |
| Density | | | | | 0.188<br>(0.406) | | | | |
| DemDecPartyInt | --- | --- | --- | --- | --- | 2.740**<br>(1.123) | 2.765*<br>(1.506) | | |
| DemDecPartyNonInt | --- | --- | --- | --- | --- | | | -3.265***<br>(1.078) | -1.501<br>(1.355) |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| DemDecPartyInt* LFD_health | --- | --- | --- | --- | --- | --- | -0.092 (3.439) | | |
| DemDecPartyNonInt* LFD_health | --- | --- | --- | --- | --- | --- | | | -6.606** (3.064) |
| Adjusted $R^2$ | 0.858 | 0.858 | 0.871 | 0.879 | 0.878 | 0.862 | 0.861 | 0.869 | 0.877 |
| Countries | 49 | 49 | 49 | 49 | 49 | 46 | 46 | 46 | 46 |
| Observations | 166 | 166 | 166 | 166 | 166 | 154 | 154 | 154 | 154 |

*Notes:* All regressions report period SUR panel corrected standard errors in parentheses and include period fixed effects and a constant (not shown). *, **, *** measures statistical significance at the 10, 5 and 1 percent levels respectively. The three countries lost due to missing values in models 6 to 9 are China, Iceland, and Malta.

## Table 3 – Robustness

| Dependent variable: HAQ | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 | Model 7 | Model 8 |
|---|---|---|---|---|---|---|---|---|
| Dec. of health spending – local (LFD) | -2.267*<br>(1.215) | -2.571**<br>(1.257) | -6.625**<br>(2.796) | -10.476***<br>(3.276) | -10.116***<br>(3.273) | -5.371***<br>(2.043) | -5.123**<br>(2.080) | -5.450***<br>(2.052) |
| Log of per capita GDP (PPP) | 4.008*<br>(2.206) | 4.801**<br>(2.255) | 5.823<br>(4.143) | 3.578<br>(3.798) | 3.943<br>(3.760) | 4.160<br>(3.032) | 5.184*<br>(3.087) | 5.015*<br>(2.992) |
| Log of population | -0.313<br>(0.261) | -0.388<br>(0.279) | 0.402<br>(0.495) | 0.261<br>(0.466) | 0.268<br>(0.463) | 0.419<br>(0.412) | 0.417<br>(0.411) | 0.314<br>(0.406) |
| Income inequality | -0.053<br>(0.101) | -0.011<br>(0.106) | -0.464***<br>(0.155) | -0.593***<br>(0.156) | -0.588***<br>(0.156) | -0.396***<br>(0.131) | -0.354**<br>(0.144) | -0.369***<br>(0.131) |
| Ethnical fractionalisation | -5.769**<br>(2.462) | -6.134**<br>(2.600) | -4.578<br>(3.690) | -3.210<br>(3.763) | -3.636<br>(3.737) | -5.131<br>(3.242) | -6.178*<br>(3.187) | -5.432*<br>(3.168) |
| Democracy | 0.122<br>(0.425) | 0.116<br>(0.447) | 0.289<br>(0.263) | 0.075<br>(0.241) | 0.091<br>(0.243) | 0.146<br>(0.208) | 0.174<br>(0.216) | 0.103<br>(0.217) |
| Log of per capita health expenditure | 3.926***<br>(1.334) | 3.731***<br>(1.399) | 3.195<br>(2.252) | 2.658<br>(2.306) | 2.419<br>(2.253) | 3.291*<br>(1.836) | 3.010<br>(1.826) | 2.519<br>(1.988) |
| Dec. of health spending - state | 4.307**<br>(1.892) | 4.279**<br>(2.009) | -0.309<br>(3.668) | 1.433<br>(3.574) | 1.088<br>(3.583) | 0.810<br>(3.279) | 0.881<br>(3.293) | 1.330<br>(3.297) |
| Governance quality | -0.294<br>(0.300) | -0.392<br>(0.314) | -0.146<br>(0.498) | 0.403<br>(0.530) | 0.407<br>(0.529) | 0.262<br>(0.434) | 0.249<br>(0.445) | 0.260<br>(0.437) |
| Local tax Autonomy | 14.046***<br>(4.297) | 14.649***<br>(4.484) | --- | 15.160<br>(10.012) | 13.001<br>(9.856) | 11.993*<br>(6.246) | 11.049*<br>(6.277) | 11.729*<br>(6.267) |
| Local policy scope in health | -0.89**<br>(0.514) | --- | --- | --- | --- | --- | --- | --- |
| Local effective political discretion in health | --- | -0.230<br>(0.600) | --- | --- | --- | --- | --- | --- |
| Local revenue decentralization | --- | --- | 18.296*<br>(9.566) | --- | --- | --- | --- | --- |
| Local transfer dependence | --- | --- | --- | 0.159<br>(4.638) | --- | --- | --- | --- |
| Local vertical fiscal imbalance | --- | --- | --- | --- | -1.300<br>(4.570) | --- | --- | --- |
| Local transfer conditionality | --- | --- | --- | --- | --- | -1.405<br>(1.989) | --- | --- |
| EU | --- | --- | --- | --- | --- | --- | -0.597<br>(1.195) | --- |
| Transition economies | --- | --- | --- | --- | --- | --- | 0.840<br>(1.710) | --- |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Government size | -- | --- | --- | --- | --- | --- | --- | 6.212<br>(8.531) |
| Adjusted $R^2$ | 0.917 | 0.911 | 0.857 | 0.881 | 0.880 | 0.854 | 0.853 | 0.854 |
| Countries | 35 | 35 | 39 | 35 | 35 | 49 | 49 | 49 |
| Observations | 127 | 127 | 123 | 106 | 106 | 166 | 166 | 166 |

*Notes:* All regressions report period SUR panel corrected standard errors in parentheses and include period fixed effects and a constant (not shown). *, **, *** measures statistical significance at the 10, 5 and 1 percent levels respectively. Data limitations mean that: regressions 1 and 2 are drawn from the sample of European countries as identified in Table A.1 in the Appendix; regressions 3, 4 and 5 do not include Bulgaria, Cyprus, Denmark, France, Greece, Ireland, Luxembourg, Poland, Slovakia and Slovenia, while regressions 4 and 5 moreover omit, the Czech Republic, Finland, Italy and Portugal.

## Appendix

### Table A.1 – List of countries

| | | | |
|---|---|---|---|
| *ARM - Armenia* | *FIN – Finland* | *LTU – Lithuania* | RUS – Russian Fed. |
| AUS – Australia | *FRA – France* | *LUX – Luxembourg* | *SER – Serbia* |
| *AUT – Austria* | *GBR – United Kingdom* | *LVA – Latvia* | SLV – El Salvador |
| *BEL – Belgium* | *GRC – Greece* | *MDA – Moldova* | *SVK – Slovakia* |
| *BGR – Bulgaria* | *HRV – Croatia* | *MLT – Malta* | *SVN – Slovenia* |
| *CHE – Switzerland* | *HUN – Hungary* | MUS – Mauritius | *SWE – Sweden* |
| CHN – China | IDN – Indonesia | *NLD – Netherlands* | THA – Thailand |
| *CYP – Cyprus* | *IRL – Ireland* | MNG – Mongolia | TUR – Turkey |
| *CZE – Czech Rep.* | *ISL – Iceland* | *NOR – Norway* | *UKR – Ukraine* |
| *DEU – Germany* | ISR – Israel | NZL – New Zealand | ZAF – South Africa |
| *DNK – Denmark* | *ITA – Italy* | *POL – Poland* | |
| *ESP – Spain* | JPN – Japan | *PRT – Portugal* | |
| *EST – Estonia* | KAZ – Kazakhstan | *ROU – Romania* | |

*Note*: In italics, the 35 European countries referred to in the text.

**Table A.2 – Descriptive statistics**

| Variable | | Mean | Std. Dev. | Min | Max | Observations |
|---|---|---|---|---|---|---|
| Healthcare access and quality | overall | 77.56 | 10.67 | 44.70 | 93.60 | N = 166 |
| (HAQ) index | between | | 10.97 | 47.80 | 90.65 | n = 49 |
| | within | | 2.98 | 70.54 | 84.54 | T-bar = 3.38776 |
| Life expectancy at birth | overall | 76.539 | 5.287 | 53.400 | 83.900 | N = 166 |
| | between | | 5.254 | 57.900 | 83.067 | n = 49 |
| | within | | 1.526 | 72.039 | 81.239 | T-bar = 3.38776 |
| Healthy life expectancy | overall | 67.024 | 4.307 | 49.000 | 74.000 | N = 165 |
| (HALE) at birth | between | | 4.339 | 51.000 | 73.167 | n = 49 |
| | within | | 1.175 | 63.774 | 70.774 | T-bar = 3.36735 |
| Healthy life expectancy | overall | 16.245 | 1.995 | 10.340 | 20.040 | N = 165 |
| (HALE) at 60 | between | | 2.001 | 10.660 | 19.648 | n = 49 |
| | within | | 0.598 | 14.779 | 17.531 | T-bar = 3.36735 |
| Infant mortality (in logs) | overall | 1.725 | 0.712 | 0.531 | 3.906 | N = 166 |
| | between | | 0.719 | 0.826 | 3.700 | n = 49 |
| | within | | 0.232 | 1.040 | 2.367 | T-bar = 3.38776 |
| Child mortality (in logs) | overall | 1.992 | 0.725 | 0.892 | 4.329 | N = 166 |
| | between | | 0.734 | 1.182 | 4.096 | n = 49 |
| | within | | 0.238 | 1.350 | 2.620 | T-bar = 3.38776 |
| Dec. of health spending - Local | overall | 0.270 | 0.333 | 0.000 | 0.986 | N = 166 |
| | between | | 0.321 | 0.000 | 0.982 | n = 49 |
| | within | | 0.099 | -0.152 | 0.804 | T-bar = 3.38776 |
| Dec. of health spending - State | overall | 0.082 | 0.221 | 0.000 | 0.923 | N = 166 |
| | between | | 0.209 | 0.000 | 0.814 | n = 49 |
| | within | | 0.040 | -0.164 | 0.391 | T-bar = 3.38776 |
| GDP per capita PPP (in logs) | overall | 10.214 | 0.643 | 8.388 | 11.606 | N = 166 |
| | between | | 0.662 | 8.471 | 11.520 | n = 49 |
| | within | | 0.159 | 9.691 | 10.656 | T-bar = 3.38776 |
| Population (in logs) | overall | 16.055 | 1.672 | 12.523 | 21.029 | N = 166 |
| | between | | 1.712 | 12.612 | 21.003 | n = 49 |
| | within | | 0.045 | 15.902 | 16.200 | T-bar = 3.38776 |
| Gini (income inequality) | overall | 0.3118 | 0.0623 | 0.2162 | 0.5856 | N = 166 |
| | between | | 0.0647 | 0.2385 | 0.5812 | n = 49 |
| | within | | 0.0091 | 0.2824 | 0.3432 | T-bar = 3.38776 |
| Ethnic fractionalisation | overall | 0.298 | 0.222 | 0.012 | 0.929 | N = 166 |
| | between | | 0.225 | 0.012 | 0.929 | n = 49 |
| | within | | 0.000 | 0.298 | 0.298 | T-bar = 3.38776 |
| Democracy | overall | 8.320 | 3.850 | -7.000 | 10.000 | N = 166 |
| | between | | 3.831 | -7.000 | 10.000 | n = 49 |
| | within | | 0.363 | 6.620 | 9.720 | T-bar = 3.38776 |
| Health expenditure per capita | overall | 7.173 | 1.232 | 4.025 | 8.975 | N = 166 |
| (in logs) | between | | 1.300 | 4.164 | 8.917 | n = 49 |
| | within | | 0.214 | 6.584 | 7.617 | T-bar = 3.38776 |
| Local tax autonomy | overall | 0.145 | 0.119 | 0.000 | 0.503 | N = 166 |
| | between | | 0.115 | 0.000 | 0.468 | n = 49 |
| | within | | 0.037 | -0.022 | 0.352 | T-bar = 3.38776 |
| Urban population 50 | overall | 0.3563 | 0.1241 | 0.1350 | 0.6700 | N = 166 |
| | between | | 0.1255 | 0.1462 | 0.6687 | n = 49 |
| | within | | 0.0170 | 0.3163 | 0.4138 | T-bar = 3.38776 |
| Urban population 300 | overall | 0.36.043 | 0.2197 | 0.0000 | 0.8710 | N = 166 |
| | between | | 0.2195 | 0.0000 | 0.8605 | n = 49 |
| | within | | 0.0175 | 0.3139 | 0.4703 | T-bar = 3.38776 |
| Density (in logs) | overall | 4.309 | 1.388 | 0.410 | 7.201 | N = 166 |
| | between | | 1.385 | 0.434 | 7.153 | n = 49 |
| | within | | 0.045 | 4.155 | 4.454 | T-bar = 3.38776 |
| Governance quality | overall | 3.636 | 3.339 | -3.454 | 8.487 | N = 166 |
| | between | | 3.420 | -2.911 | 8.143 | n = 49 |
| | within | | 0.367 | 2.612 | 4.458 | T-bar = 3.38776 |
| Local policy scope in health | overall | 0.709 | 0.678 | 0.000 | 2.000 | N = 127 |
| | between | | 0.672 | 0.000 | 2.000 | n = 35 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | within | | 0.093 | 0.184 | 1.184 | T-bar = 3.62857 |
| Local effective political discretion in health | overall | 0.596 | 0.610 | 0.000 | 2.000 | N = 127 |
| | between | | 0.606 | 0.000 | 2.000 | n = 35 |
| | within | | 0.077 | 0.096 | 1.096 | T-bar = 3.62857 |
| Local revenue decentralization | overall | 0.147 | 0.114 | 0.002 | 0.626 | N = 123 |
| | between | | 0.108 | 0.002 | 0.575 | n = 39 |
| | within | | 0.035 | 0.014 | 0.329 | T-bar = 3.15385 |
| Local transfer dependency | overall | 0.417 | 0.241 | -0.045 | 0.936 | N = 106 |
| | between | | 0.236 | 0.061 | 0.890 | n = 35 |
| | within | | 0.069 | 0.073 | 0.707 | T-bar = 3.02857 |
| Local vertical fiscal imbalance | overall | 0.423 | 0.239 | -0.093 | 0.911 | N = 106 |
| | between | | 0.228 | 0.059 | 0.879 | n = 35 |
| | within | | 0.074 | 0.058 | 0.714 | T-bar = 3.02857 |
| Local transfer conditionality | overall | 0.732 | 0.326 | 0.000 | 1.000 | N = 166 |
| | between | | 0.320 | 0.000 | 1.000 | n = 49 |
| | within | | 0.000 | 0.732 | 0.732 | T-bar = 3.38776 |
| Government size | overall | 0.4098 | 0.0894 | 0.1746 | 0.5738 | N = 166 |
| | between | | 0.0927 | 0.1782 | 0.5439 | n = 49 |
| | within | | 0.0234 | 0.3326 | 0.5388 | T-bar = 3.38776 |

*Notes:* Does not include dummy variables.