

Decentralization and access to social services in Colombia

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Abstract Decentralization is meant to improve access to public services, but relatively few studies examine this question empirically. We explore the effects of decentralization on access to health and education in Colombia using an original database covering over 95 % of Colombian municipalities. We show that decentralization improved enrollment rates in public schools and access of the poor to public health services. In both sectors, improving access was driven by the financial contributions of local governments. Small increases in own-shares of spending led to surprisingly large increases in the access of the poor in both sectors. Our theoretical model implies that where local information dominates productive efficiency, elected local governments will provide services better tailored to local needs. Decentralizing such services should increase their use by the public. Together, theory and empirics imply that decentralization made the Colombian state more accountable. It provided local officials with the information and incentives they need to allocate resources in a manner responsive to voters' needs and improve the impact of public expenditures.

Keywords Decentralization · Education · Health · Public investment · Colombia · Local government

JEL Classification H41 · H75 · H77 · 01

1 Introduction

Across both the developing and developed worlds, policy reformers are experimenting with a wide array of federalist tools and incentives, ranging from administrative deconcentration to the full-scale devolution of power and resources to subnational levels of government

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(Manor 1999; World Bank 2004). Their efforts are based on theoretical arguments about decentralization's potential to improve the efficiency of public services and make government more accountable to the governed (Faguet 2012). But these are counterbalanced by equally plausible arguments that local governments will tend to be less efficient, capable, or more corrupt than central governments (Treisman 2007). Important questions that are unresolved theoretically call for empirical study.

This paper adds to the evidence on decentralization's effects on public sector outcomes by examining access to education and health services in Colombia. We use an original database to investigate decentralization's effects on public school enrollments and public health insurance coverage of the poor. To our knowledge, we are the first to address these questions with econometric tools. Colombia is an interesting case worthy of study for three reasons. First, unlike many countries that have passed decentralization laws, Colombia implemented a significant reform vigorously, including substantive institutional reforms that increased citizens' opportunities for voice and participation in local policy-making. Such legal and institutional instruments are crucial if decentralization is to be effective. Their presence sets Colombia apart from many instances of "partial decentralization" (Devarajan et al. 2009). As a result, Colombia's reforms had large, measurable effects on public finances and domestic politics; we provide evidence below. Second, the quantity and quality of subnational data available for Colombia are particularly high, especially in comparison to other middle-income countries. Thirdly and more subtly, it is our view that much of the huge decentralization literature is plagued by an excess of cross-country comparison. Too much of the empirical literature is based upon: (a) large- N cross-country studies, which suffer from problems of data comparability and multiple institutional, historical, and other external factors that are difficult to control for, or (b) small- N studies of decentralization in one or a few countries based on qualitative evidence. Our study avoids these methodological pitfalls by conducting a large- N study of a single country, Colombia. This allows us to focus in depth on the process and institutional context of reform, and probe its effects with a large amount of data. By studying decentralization in this way, we can combine the formal rigor and generality of large- N approaches with the detailed knowledge and analytical nuance of small- N studies, while avoiding variation in the deep structural factors that create difficulties for cross-country work in this field.

Decentralization is henceforth defined as the devolution by central government of authority over specific functions, with all of the administrative, political and economic attributes that these entail (e.g., tax-raising, expenditure, and decision-making powers), to democratic local governments that are independent of the center within a legally delimited geographic and functional domain. The rest of the paper is organized as follows. Section 2 reviews the theoretical and empirical literature on decentralization. Section 3 discusses the Colombian decentralization program, focusing on its legal and budgetary aspects, and provides descriptive statistics for public investment flows and access to education and health services during the period immediately following decentralization. Section 4 provides a simple model of joint provision of local public goods as a Stackelberg leader-follower game in which political competition gives local governments better information on local preferences, but central government is more productively efficient. Section 5 presents our quantitative methodology. Section 6 examines whether decentralization increased school enrollment and access to health care in Colombia with econometric evidence. Section 7 concludes.

2 Literature review

In terms of productive efficiency, central government should naturally be superior to local government so long as returns are at least slightly increasing. An analogous argument holds for the question of administrative efficiency. The move from centralized to decentralized government thus immediately implies two types of efficiency loss: smaller economies of scale in the production of public goods per se, and lower administrative efficiency as staff costs and overheads multiply across many local administrations. Federal systems face the additional hurdle of designing rules and funding institutions that coordinate policy across local, regional and national levels of government, which a unified central government can simply ignore. Any economic case for decentralization must therefore invoke counterbalancing sources of efficiency in which local governments have advantages; such efficiencies must outweigh the efficiency losses. Where might they come from?

Different authors have approached the problem in different ways. Tiebout's (1956) seminal work focuses on heterogeneity in both individual tastes and public goods provision across different localities. He posits a world in which individuals move costlessly amongst localities that provide different levels of a public good, which are fully financed by local taxation. The ensuing competitive equilibrium in locational choices produces an efficient allocation. Hence, information about what individuals' want is revealed when they "vote with their feet". The Tiebout model has been influential, spawning a large sub-literature of empirical studies. Interesting examples include Oates (1972) and works by Ostrom and others (e.g., Ostrom and Whitaker 1973; Ostrom et al. 1993). Dowding and John (1994) survey over 200 such studies.

The most influential public economics model of decentralization over the past 40 years is due to Oates (1972), who builds on Tiebout to compare decentralized with centralized public goods provision. In both cases governments seek to maximize the welfare of their constituents. Under centralization, government chooses a uniform level of public good for all districts, even though districts may vary in their preferences or needs. Under decentralization, heterogeneous districts can choose different levels of public good provision. But decentralized governments ignore spillovers, whereas centralized government takes them into account in determining the level of public goods.

The trade-off at the heart of Oates's analysis, and most of the generation of public economics models of decentralization that followed, pits the extent of heterogeneity in tastes between districts against the degree of spillovers amongst them. This can be thought of as "responsiveness" versus "efficiency". The resulting *Oates Decentralization Theorem* states that where there are no spillovers but tastes amongst districts vary, decentralization is superior. Where there are spillovers but districts have identical tastes, centralization is superior. Where both spillovers and heterogeneity of tastes exist, the two effects must be compared in order to determine which regime is preferable.

Besley and Coate (2003) replace the assumption of central uniformity with a political economy model of elections followed by legislative bargaining. Costs of provision are shared under centralization, creating conflicts of interest between citizens in different districts over the level and distribution of public goods provision. They find that for heterogeneous districts, decentralization continues to be welfare superior in the absence of spillovers, but centralization is no longer superior when spillovers are present. Greater heterogeneity reduces the relative performance of centralization for any level of spillovers. Although these conclusions mirror those of Oates, the logic underpinning them is quite different.

But why would decentralized governments be more responsive than centralized government to heterogeneous local preferences in the first place? In comparison to central government, local government is said to benefit from: (i) more and/or better information regarding

local preferences and conditions; (ii) louder citizen voice and participation in the government process; and (iii) superior accountability, and, hence, responsiveness of public servants to citizens. All of these effects, it is claimed, come about as a result of the creation of functionally independent local governments that are physically closer to their electorates (than central government), and whose political fortunes are in the hands of those who benefit—or suffer—from the local services they provide. If “bringing government closer to the people” leads to improved information, voice, participation and accountability in public decision-making, then local public services should improve as a result. Services can improve in two broad ways: (a) lower costs through greater productive efficiency and less corruption; and (b) higher quality, interpreted to include services better-suited to local needs and conditions. Improved services, in turn, should lead to more intensive use by local citizens, and thence to better substantive outcomes. Examples of better substantive outcomes include higher educational test scores or lower mortality rates.

Few studies attempt to test this argument directly, especially when compared to the vast size of the broader decentralization literature, and the frequency with which this and related arguments are invoked. Five studies that we know of address the link between decentralization and substantive outcomes directly and with rigorous quantitative evidence. Escaleras and Register (2012) find that fiscal decentralization is associated with lower natural disaster death rates, implying more effective preparation and/or responses to natural disasters by countries with decentralized governments. Clark (2009) applies regression discontinuity to a natural experiment from Britain to show that schools that opt out of the centralized educational regime—in effect decentralizing themselves—enjoy large increases in student achievement. Galiani et al. (2008) find that decentralization of school control from central to provincial governments in Argentina had a positive impact on student test scores. The poorest, however, did not gain, and indeed may have lost. And Barankay and Lockwood (2007) find that greater decentralization of education to Swiss cantons is associated with higher educational attainment, especially for boys.

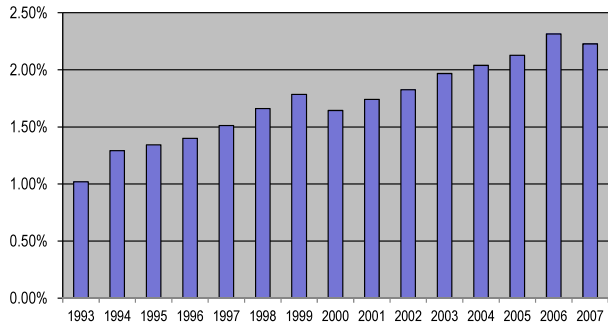
Other recent empirical studies ask related questions about decentralization’s effects on government size, corruption, and whether it improves local information or abets elite capture. Cassette and Paty (2010) find that revenue decentralization reduces national government size in a sample of European countries, but increases subnational government size to a greater extent, resulting in larger overall governments. Wu and Lin (2012) similarly find that both expenditure decentralization and revenue decentralization increase the size of local governments in China. Rodden (2003) uses cross-country panel data to show that decentralization is associated with faster growth in government spending of common resources, but slower growth when spending is funded by autonomous local taxation. And Prohl and Schneider (2009) show that direct democracy in local government has a strong negative effect on public sector growth.

3 Decentralization in Colombia

3.1 The decentralization program

Unlike countries where decentralization was implemented quickly, such as Bolivia (Faguet and Sánchez 2008; Faguet 2012), the Colombian process took some 25 years. Until the early 1990s, progress was slow and often stalled, as debates waxed and waned about loosening the reigns of control of a highly centralized administrative apparatus inherited from the Spanish crown. Colombia’s mayors and governors were then named directly by central government;

Fig. 1 Municipal own-tax receipts (constant 2007 pesos).
 Source: National Planning Department



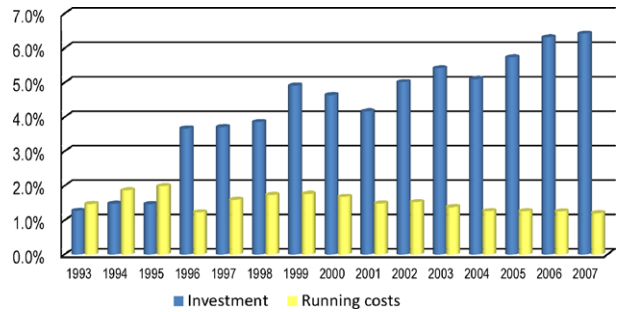
governors in particular were the President's *hombres de confianza*, and carried out his will in the regions. But over time as the proponents of reform grew in strength, reform deepened, moving from the fiscal and bureaucratic to the political, culminating in the constitutional reform of 1991. Ceballos and Hoyos (2004) identify three broad phases of decentralization, to which we add a fourth:

Phase one began in the late 1970s, and included fiscal measures aimed at strengthening municipal finances. Most important were laws 14 of 1983 and 12 of 1986, which expanded the tax collection powers, especially sales taxes, of municipalities, and established parameters for the investment of these funds. Locally raised municipal “own resources”, the use of which is unfettered by regional or central governments, grew dramatically as a result (see Fig. 1). Beginning in the mid-1980s, *phase two* was more concerned with political and administrative matters. Law 11 of 1986 regulated the popular election of mayors and sought to promote popular participation in local public decision-making via *Juntas Administradoras Locales*, amongst others. Reforms enshrined in the 1991 constitution, such as citizens’ initiatives, municipal planning councils, open town meetings, the ability to revoke mayoral mandates, and popular consultations, deepened political decentralization further. Regional governors became elected by popular vote.

Phase three consisted of laws that regulated the new constitution, and other related fiscal and administrative reforms. These measures assigned significant responsibility to municipalities for the provision of public services and social investment, and increased central transfers to local governments significantly. The laws leave local governments little discretion over transferred funds, mandating that the bulk should be spent on education and health. Automatic transfers to sub-national governments rose from 20 % to over 40 % of total public spending, placing Colombia first in the region amongst unitary states, and third overall behind federal Brazil and Argentina.

A decade later, *phase four* consisted of further constitutional reform and the wide-ranging, complementary Law 715 of 2001, which re-defined the powers and responsibilities devolved to municipal and departmental governments. These are surprisingly extensive. In education, municipal governments are charged with “directing, planning and providing educational services at the pre-school, primary and middle-school levels with equal access, efficiency and good quality” (Republica de Colombia 2001), managing educational institutions, including teaching and administrative personnel, financing educational activities from own resources and devolved funds, evaluating the performance of headmasters, rectors and other educational leaders, and maintaining current coverage and working for its improvement, to name just a few (Ladino O. 2008). In health, article 44 of Law 715 charges municipalities with “directing and coordinating the health sector and General Health Insurance within municipal jurisdictions” (Republica de Colombia 2001). This is further broken down into 19

Fig. 2 Municipal expenditure and investment (% GDP). *Source:* National Planning Department; authors' calculations



specific powers and competences, much as for education above. The law devolves further powers to municipalities in areas such as: housing, agriculture and fisheries, transport, the environment, prisons, recreation, culture, natural disasters, and others.

3.2 Descriptive statistics

Detailed municipal-level expenditure and investment data are available for Colombia from 1993 onwards. While reliable data on municipal revenues and transfers are available up to 2007, the most recent good data on expenditures and outcomes varies between 2003 and 2007, depending on sector. The lack of older data means that we cannot compare decentralized investment priorities to a relatively “pure” centralized regime (pre-1980s). The characteristics of Colombia’s reform process, marked by gradualism and long-term change, make this less of a problem. As discussed above, a number of key decentralizing mechanisms, such as citizens’ initiatives, referendums, mayoral recall, and larger resource transfers, were put in place only with the 1991 constitutional reform and accompanying regulations. These transferred resources and authority to municipalities gradually over time. Hence, the outlines of Colombia’s decentralization “package” became fully clear only in 1992–1993, setting off a process that deepened thereafter. Indeed, the empirical measures of decentralization that we use below all show monotonically rising levels of decentralization throughout the period. Hence, hereafter we treat the beginning of the period (1993–1994) as years with relatively high centralization, and the end of the period (2004–2007) as years with relatively high decentralization.

The aggregate effect of a quarter-century of political and fiscal reforms was a large increase in the political authority and operational independence of Colombia’s municipal governments, accompanied by a huge rise in the resources they controlled. Municipalities were allowed to raise significant taxes and issue public debt, and could spend these resources as they chose. This point is important to our identification strategy below. It gave local authorities a strong incentive to increase local tax receipts, which they did by more than 330 % in constant pesos. This was due more to local tax effort than to economic growth. Figure 1 shows that local taxes as a proportion of GDP more than doubled between 1993 and 2007. Central-to-local government transfers also increased over the same period, although less strongly—by 139 %. Total municipal expenditures and investments rose from 2.7 % to 7.6 % of GDP over a decade, as detailed in Fig. 2. This huge rise went entirely to additional investment, while running costs declined significantly after 1995.¹

¹ Colombia’s public accounts classify such items as teachers’ and health workers’ salaries as investments, and not running costs.

Fig. 3 Central vs. local government investment. *Source:* National Planning Department; original calculations

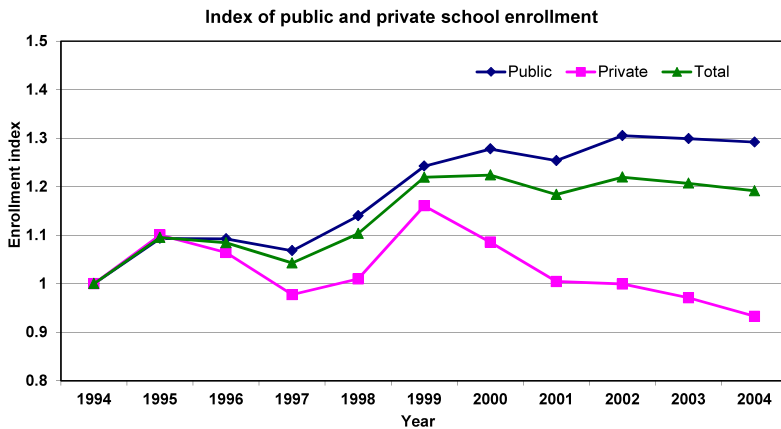
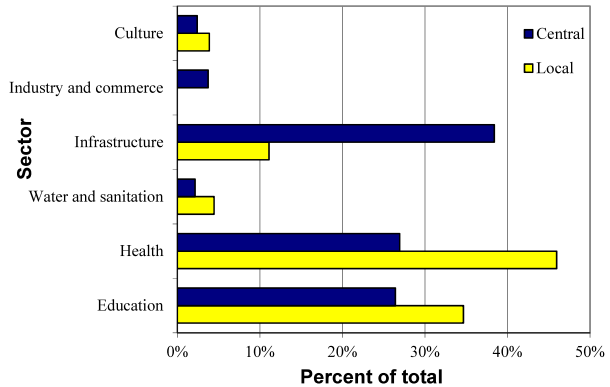


Fig. 4 Decentralization and school enrollment. *Source:* National Planning Department; original calculations

How were these resources invested? To compare like with like, Fig. 3 provides a sectoral breakdown of central government investment in 1994 alongside local government investment *of own resources* in 2003. This is a revealed preference exercise, and it exposes large differences. Central government's largest category is infrastructure, at 38 % of the total, whereas local government's largest is health, followed by education, which together comprise 81 % of the local investment budget. The broader pattern of dark and light bars shows a clear shift in public sector priorities, and resources, away from infrastructure and industry and commerce, into health, education, and water and sanitation.

Lastly, is there any evidence of changes in education and health outcomes? We focus on school attendance and access to the public health system, acknowledging from the outset that such evidence is merely descriptive, and cannot show causality. Nonetheless it is useful to see general trends before moving on to proper analysis. Figure 4 shows enrollment data over the decade for public and private schools, with enrollment in 1994 indexed to one. At the outset, public and private enrollment trends are quite similar. After 1996, a widening gap opens up between them, although they follow similar up and down trends. After 1999, however, slopes diverge, leading to a large gap between the two educational systems. Decentralization coincides with a 20 % increase in total school enrollment, unequally distributed: public school enrollment increased 30 %, while private school enrollment fell 7 %. This

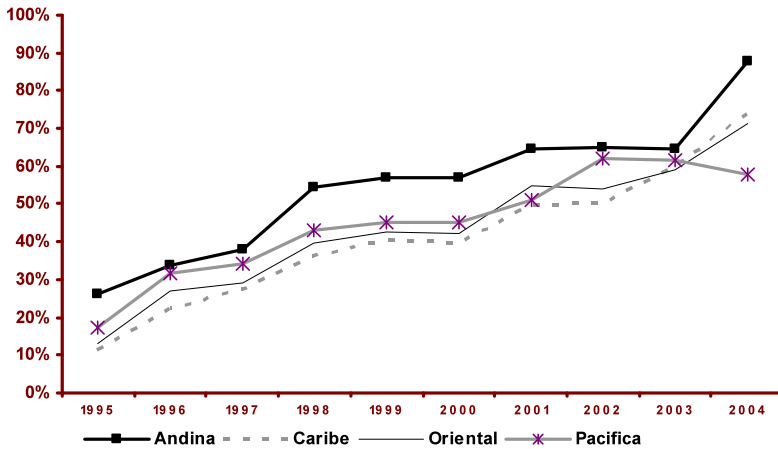


Fig. 5 Health insurance coverage rate by regions. *Source:* National Planning Department; original calculations

suggests that local governments may have been able to run schools and promote attendance better than central government had before.

Figure 5 shows the proportion of poor Colombians enrolled in the country's public health insurance scheme. The *regimen subsidiado de salud* is the means by which the state provides subsidized insurance covering primary and emergency health care for the poor. "Access" in this case is not a vague concept as it is in some surveys—e.g., population living within a health facility's catchment area—but, instead, has a quite specific meaning: individuals actively enrolled in the *regimen*, with name, address, and other details registered at the Ministry of Health. It is reasonable to assume that such individuals are aware of the public health system and of their eligibility to receive benefits from it, and hence use it.

Figure 5 shows that access to health care rose dramatically throughout Colombia. In the Andean region the proportion of poor people covered by the *regimen subsidiado* rose from 27 % to almost 90 %. The worst-performing region initially—the Caribbean—saw an even more dramatic gain, with access rising from about 11 % of the poor to just over 70 %. The period of deepening decentralization in Colombia thus coincided with a dramatic improvement in the access of the poor to health care, with increases of between 200 % and 550 %. Was decentralization responsible for these improvements? Descriptive statistics can only suggest. We return to this question with rigorous evidence below.

4 A simple model of public goods provision

As in many countries, Colombia's local education and health services are jointly provided by central and local governments. The evidence in section six below thus focuses on the effects that greater local control of the finance and administration of primary services has on service uptake by local citizens. But before delving into the empirics of the question, it is useful for the sake of conceptual clarity to formalize the interplay between center and periphery. To better understand how interactions between them affect provision of a common local public good, this section develops a simple model of joint provision, following Varian (1994) and Batina and Ichori (2005), in which central government moves first, and local government is a Stackelberg follower.

The key tradeoff is that local governments have better information about local preferences, but central government is more efficient in the production of public goods. The former is due to local political competition, which we can think of as election cycles and the lobbying, campaigning and related dynamics these entail, which provide local governments with information. Political competition does not, by contrast, provide central government with useful information about local preferences. This is because national elections do not focus on local issues and specific local policy options in the way that local elections do. The latter half of the tradeoff may be thought of as any one of three distinct central advantages: (i) traditional economies of scale, (ii) technological or organizational superiority in the production of public goods, (iii) or efficiency gains from the internalization of spillovers.² In many countries, for example, the most capable public sector professionals work for central, not local, government. This allows central agencies to design, plan, and implement interventions that are higher quality, more cost effective, or both.

Assume a country made up of T districts, each with population n_j where j denotes district. Individuals have linear utility $U_i = \ln(x_i) + \theta_i \ln(g_j)$ where x_i is the amount of private good consumed by individual i , g_j is the amount of public good available in district j , and θ_i is individual i 's preference for public good g_j . Utility is a well-behaved, convex function that is additively separable in x and g . Central and local governments' contributions to the common public good are denoted g_j^c and g_j^l ; hence, $g_j = g_j^c + g_j^l$. We denote the local median preference for the public good in district j as θ_{mj} . Local welfare is defined as median utility, $U_{mj} = \ln(x_{mj}) + \theta_{mj} \ln(g_j)$.

The function of government is to provide public goods, which it finances with a local head tax. Local government ascertains θ_{mj} with probability p_l and θ_{-mj} with probability $(1 - p_l)$, and central government ascertains θ_{mj} with probability p_c and θ_{-mj} with probability $(1 - p_c)$. These probabilities vary as $p_{l,c} \in [0, 1]$, and θ_{-mj} is defined as an unrestricted value of θ other than θ_{mj} . By assumption (see above), p_l increases with the amount and duration of political competition in a municipality, whereas p_c does not. For notational simplicity political competition is proxied by e , the number of elections since the inception of local government in a municipality. Hence

$$p_l = f(e), \quad \frac{dp_l}{de} > 0, \quad \text{and} \quad \frac{dp_c}{de} = 0.$$

Central government's superior efficiency is modeled as a cost advantage in the provision of a given public good. The head tax needed to finance a given level of provision under central government is thus $\alpha g_j/n_j$ with $0 < \alpha \leq 1$, lower than local government's tax g_j/n_j .

In this variant of the Stackelberg game, central government is the leader and announces its level of provision first. Local government observes this and calculates its optimal reaction, which it then provides. We can think of this as local government choosing a g_l that complements or tailors g_c so as to better meet local needs (or maximize a leader's private utility). The solution is via backwards induction, and so we begin with local government's reaction. For any g_c that central government chooses, local government's problem in district j is

$$\max_{g^l} \left[(p_l \theta_m + (1 - p_l) \theta_{-m}) \ln(g^l + g^c) - \frac{g^l}{n} \right] \quad (1)$$

²Which could allow central government to serve a given population with fewer facilities, and hence, lower cost than numerous local governments would provide.

where for convenience we drop subscripts j . We take first-order conditions and simplify the expression without loss of generality by letting $\theta_{-m} = 0$. Re-arranging provides local government’s optimal response

$$g^{l*} = n\theta_m p_l - g^c. \tag{2}$$

Central government sets its level of provision independently. This reflects common practice, and may be thought of as bureaucratic convenience of the center. In the real world it may be motivated by the relative variabilities of central versus local allocations over time, their relative sizes, different allocation criteria used at the central versus local levels, or the simple fact that the center moves first and local politics can be unpredictable. Central government’s problem over T districts is

$$\max_{g_1, \dots, g_T} \left[\sum_j (p_c \theta_{mj} + (1 - p_c) \theta_{-mj}) \ln(g_j^c) - \sum_j \alpha \frac{g_j^c}{n_j} \right]. \tag{3}$$

Solving for district j , we take first-order conditions and once more simplify by letting $\theta_{-m} = 0$. Re-arranging, we get central government’s optimal level of public good provision

$$g^{c*} = \frac{n\theta_m p_c}{\alpha} \tag{4}$$

which reflects central government’s superior efficiency.

Substituting (4) into (2) and letting $\tau = p_c / p_l$, we get

$$g^{l*} = n\theta_m p_l \left(1 - \frac{\tau}{\alpha} \right). \tag{5}$$

We can think of τ as the center’s sensitivity to local preferences expressed in terms of local government’s sensitivity. Local government will provide a positive quantity of public good g^{l*} only when $\tau < \alpha$, that is to say when local government’s relative accuracy in sensing local preferences more than offsets the center’s superior efficiency. In this case it is efficient for local government to provide some share of the public good, a share that rises as the value of τ/α falls. If $\tau \geq \alpha$, by contrast, then g^{l*} will be zero and all public goods will be provided by the center.^{3,4} These results provide a simple guide to what sorts of public goods and services should be decentralized and which ones provided by the center, if the central tradeoff of our model is correct.

For further implications, consider that parameters τ and α are characteristics of the specific good or service in question (e.g., primary education, local roads, sanitation), not of the locality. For services where production is small-scale and dispersed, such as primary education and primary health care, we can reasonably expect the center’s efficiency advantage over local provision to be relatively low (i.e., compared to tertiary education, trunk roads, or environmental protection), and dominated by local government’s ability to better sense local preferences; hence $\tau < \alpha$. Such services comprise a category in which individuals are well placed to assess their own needs (contrast primary education with, for example, environmental protection), and local governments are closer to individuals than central government. Hence we expect g^{l*} to have a positive value for primary education and health, and to increase over time as successive elections drive p_l closer to one. Other services, such as tertiary education, environmental protection, or indeed national defense, rely on more

³We consider only non-negative values of g^{l*} and g^{c*} .

⁴Reversing the order of play and solving for local government as the Stackelberg leader yields symmetric results in which all provision is local unless $\alpha < \tau$. We consider this order of play less realistic.

Condition	Implication	Result
$\tau = p_c/p_l < \alpha$	$g^{l*} > 0$	Access to education & health services increases with local provision due to superior local government responsiveness
$\tau = p_c/p_l \geq \alpha$	$g^{l*} = 0$	Access to other services increases with central provision due to central government's superior efficiency

Fig. 6 Model results—when is decentralized provision efficient?

specialized knowledge, have larger economies of scale, or both. Central government will have a larger advantage in the production of such services, and local governments less of an advantage in sensing locals' needs.

To summarize, the model implies that for goods where $\tau < \alpha$, such as education and health, local governments are more responsive to local needs than central government. Hence citizens' use of public education and health services should increase more in municipalities where provision is more decentralized. Figure 6 summarizes the model's predictions, which are tested empirically below. For services where $\tau < \alpha$ but central provision nonetheless dominates (i.e., $g^{l*} = 0$ in the model's terms), we expect access to be lower than if local government were involved in provision (i.e., $g^{l*} > 0$).

Interestingly, Colombian policy in effect treated τ (and α) as locality-specific—and not sector-specific—parameters. Thus discretion over transferred funds varied significantly across municipalities instead of across sectors. Some municipalities were allowed to invest central transfers as they saw fit, while elsewhere funds arrived with strong obligations governing how and where they could be spent. Additionally, some municipalities raised and spent far more own-tax revenues in the provision of public services than others, even controlling for municipal size, wealth, and so on. We describe both kinds of variation and then exploit them empirically in section six to estimate the extent to which provision by local governments improved access to education and health services.

5 Methodology

We exploit an original database of municipal characteristics using data obtained from the Agustín Codazzi Geography Institute, National Administrative Department of Statistics, National Electoral Office, National Planning Department, and the Office of the Vice Presidency (summarized in the [Appendix](#)). The database covers over 95 % of Colombian municipalities for the period 1994–2004.⁵ Within the Latin American context, Colombian municipal data are relatively abundant and detailed.⁶ All information on budgets and financial flows is panel data. All other data (e.g., demographic, infrastructural, institutional, social) is cross-sectional, from national censuses and other national surveys. Our database retains data integrity by source.⁷ We use similar variables from different sources in alternative specifications as robustness checks. The models prove robust.

We take advantage of the gradual nature of reform in Colombia to construct continuous variables that capture progressive reform, and use panel estimations to incorporate a

⁵Health data are available for the period 1997–2004.

⁶More data on a wider variety of local characteristics are collected in Colombia than any other country in the region bar Brazil.

⁷Meaning that we do not combine information from different sources into a single variable.

large information set. The availability of relatively high quality data further allows us to investigate decentralization's effects on real policy outputs, and not just changes in resource inputs, as some other studies have done (e.g., Faguet and Sánchez 2008). Section 3 showed that decentralization in Colombia was associated with marked increases in public school enrollment and access of the poor to health care. In order to investigate this relationship more rigorously, we estimate a model of access to education and health

$$\Delta A_{mt} = \alpha + \zeta D_{mt} + \beta R_{mt} + \delta C_{mt} + \varepsilon_{mt}. \quad (6)$$

In *education*, ΔA is measured by the year-on-year change in the number of students enrolled in public schools. In *health*, ΔA is measured by the change in the poor population covered by public health insurance. For both sectors, D is a vector of measures of where municipalities lie on the decentralization-centralization continuum; R is a vector of measures of resource availability (i.e., supply factors) that might independently affect student enrollment; and C is a vector of socioeconomic and geographic controls, all indexed by municipality m and year t .

Our measures of decentralization, D , are based on education and health expenditures broken down by source of revenue. They measure different levels of autonomy in municipal decision-making and resource commitment, recognizing that levels of decentralization lie along a continuum between two extremes of “highly constrained from above” and “highly autonomous”. Constraints from above can emanate from both central and regional government. The four variables are designed to measure subtle shifts along this continuum.

The first variable for both sectors is own resources—revenue raised from local taxes and charges—as a share of total expenditure. Such funds have no strings attached, and are at the disposal of local governments to spend as they like.⁸ Because such taxes are levied on local voters/taxpayers, who have the means to participate in public decision-making as described above, higher values of this first D variable indicate municipalities with more effective decentralization, where a certain institutional coherence (those who benefit from services finance their provision) has been attained. Our clearest measure of decentralization is this first D variable.

The second D variable captures the extent to which local governments are subject to regional government interventions in their policy-making. This is municipal independence—a dummy variable that records which municipalities are “certified”. Certified municipalities receive transfers directly from central government, and not via departmental (akin to state or provincial) governments. Departments normally have discretion in how they condition and disburse these funds to municipalities. Certified municipalities avoid this intermediation, and hence are freed from departmental government interventions that uncertified municipalities must endure. Local governments that score higher in the first two D variables are substantively less constrained by higher levels of government, and hence more decentralized than the rest.

Different sectors are financed in somewhat different ways, such that further measures of D cannot be identical across sectors. For the sake of clarity we separate the remainder of this discussion by sector.

⁸According to Law 617 of 2000, local taxes and other revenues levied locally belong to municipalities and may be disposed of freely by them. Such revenues differ from central transfers, which must be spent in specific ways on specific public goods. The sources of revenues available to municipalities to finance education and health services combine own resources, including tax and non-tax revenues, and transfers from central government. The latter are divided into transfers for education, health and general purposes. Up to 28 % of transfers for general purposes may be spent on running costs in the smallest and poorest municipalities, and less in larger ones (Articles 78 and 79, Law 715 of 2001). For more on this see Sánchez and Zenteno (2010).

Education

The remaining **D** variables in education record the share of total expenditure accounted for by central transfers allocated according to criteria that vary across time. Law 60 of 1993 linked central transfers for education to poverty indices from 1994–2001.⁹ In 2001, Law 715 changed the allocation criterion to the number of state school students registered in the previous year. This was meant to tie central transfers more closely to school performance, and hence educational outcomes. Hence these are the third and fourth **D** variables in education.¹⁰ Municipalities for which these values are larger face stronger incentives set by the center, and are thus much more “centralized”. The coefficients of these **D** variables, ζ_1, \dots, ζ_4 , are our main interest in these regressions. If decentralization drives increases in school enrollment, then we expect ζ_1 and ζ_2 to be positive and larger in magnitude than ζ_3 and ζ_4 .

Health

In health, the third and fourth **D** variables are the share of total expenditure accounted for by central transfers linked first to poverty indices, and then to the number of insured persons, in a manner similar to education above. The fifth **D** variable is the share of funds from FOSYGA (the Solidarity Fund)¹¹ in total health expenditures. FOSYGA is the central government’s main channel for financing and monitoring the subsidized public health system at the local level. Municipalities ranking higher on these three indicators face stronger incentives set by the center, and are thus much more “centralized”.¹² The coefficients of these **D** variables, ζ_1, \dots, ζ_5 , are our main interest in these regressions. If decentralization expands access to health, we expect ζ_1 and ζ_2 , to be positive and larger in magnitude than ζ_3, ζ_4 and ζ_5 .

Other factors that might affect student enrollment and health access do not vary by sector, and hence need not be discussed separately. These include the overall level of spending on schools and hospitals, and the quality of human resources that a municipality has at its disposal. We control for such effects with **R**, which includes a term for general expenditure growth in municipalities from all sources,¹³ a term for the lagged student-teacher ratio that proxies for capacity utilization, a term for per capita expenditure on public education or health, and a term for the share of total municipal personnel who are university graduates, as a measure of local government’s institutional capacity. By controlling for municipalities’ overall level of spending on education and health, we ensure that the **D** terms capture the effect of decentralized authority over policy and resources, and not how richly those services are funded. In other words, the coefficients of **D** capture how local control of resources and decision-making power impact the provision of education and health, after controlling for total financial and other resources expended.

⁹Law 60 of 1993 regulated the transfer system between 1994–2001. According to that law, transfers to municipalities increased with population and relative poverty as measured by Unsatisfied Basic Needs: an index measuring the proportion of the local population for whom a predetermined level of basic needs are unmet.

¹⁰The proportion of local educational spending undertaken by departmental governments is omitted in order to avoid perfect collinearity.

¹¹*Fondo de Solidaridad y Garantía* (literally the Solidarity and Guarantee Fund).

¹²Departmental health spending in the municipality as a proportion of total health spending is left out of the regression so as to avoid perfect collinearity.

¹³Total funds available locally for education and health include direct transfers from central government to municipalities, indirect spending through departments (states) for non-certified municipalities, and municipalities’ own resources.

Lastly, the variables in C control for municipal population, poverty (percentage of population with unmet basic needs), and unemployment. We also include measures of a municipality's displaced population, separated between those that receive migratory flows and those that expel them, as rough proxies for how much a locality has been impacted by Colombia's armed conflict. The lagged gross enrollment rate in education, and lagged health insurance coverage amongst the poor, capture the effects of previous coverage on the growth of social services. We expect growth to be slower where previous coverage was higher. Finally, the proportion of the school-age population attending private schools captures complementarities between public and private enrollment.

We estimate using random effects with year and departmental dummies. We prefer this to the usual fixed effects model for three reasons. First, our dependent variable (ΔA) is the percentage change in either school enrollments or health coverage. While there are good reasons why *levels* of either variable might vary systematically by municipality, implying fixed effects, this is not true of the first difference. Hence, there is no intuitive case for fixed effects. Second, a Hausman test shows that random effects estimates are consistent.¹⁴ And third, we explicitly control for those fixed effects that our knowledge of the Colombian context leads us to think are a relevant source of variation: departmental and year fixed effects. We see no benefit from controlling further for individual municipal fixed effects, only a significant efficiency loss. Lastly, a Wooldridge test suggests serial correlation; we therefore cluster errors by municipality.¹⁵

The specification in (6) is based on the theory that a given level of expenditure will produce improved outputs when allocated and executed locally rather than centrally. In this case, outputs are measured as student enrollment rates and access of the poor to subsidized health care, and inputs are measured as locally controlled resources. But there is the possibility of the opposite relationship and, hence, endogeneity, if independently increasing enrollment rates are instead causing municipalities to spend more of their own resources on education and health. Hence we also estimate Eq. (6) instrumenting for D_1 with the mineral and hydrocarbon royalties received by municipality m at time t as a proportion of its 1994–2004 average current revenues.

The economic logic for this instrument is two-fold. On the one hand, higher royalties imply greater resources that can be freely allocated through a budgeting process for health and education. In other words, the channel through which royalty revenues affect education and health outcomes is decisions made in the local budgeting process. On the other hand, reverse causality cannot apply as the royalties received by a particular municipality depend upon the national legal and regulatory framework, and is in no way linked to its performance in the provision of social services. The distribution of royalties among the three tiers of government (national, departmental and municipal) for the period under study is regulated by Laws 141 of 1994 and 756 of 2002.¹⁶ Both departments and municipalities are obliged to spend royalties on investment projects that are part of their development plans, or on social services if coverage is below a threshold determined by the law. Nevertheless, the allocation

¹⁴Hausman test results for education: $\chi^2(1) = 0.02$ with $\text{Prob} > \chi^2 = 0.8997$; for health: $\chi^2(1) = 0.21$ with $\text{Prob} > \chi^2 = 0.6449$.

¹⁵Wooldridge test results for education: $F(1, 1075) = 58.66$ with $\text{Prob} = 0.00$; for health: $F(1, 1056) = 8.660$ with $\text{Prob} = 0.0033$.

¹⁶According to Law 141, those who exploit a non-renewable natural resource must pay a percentage of the value of production in royalties. Percentages vary according to the resource exploited and the amount extracted. Royalties are paid to the Treasury, which distributes these amongst the departments and municipalities where exploitation took place, including exporting ports and municipalities crossed by pipelines.

of royalty revenues among the different projects and social services is an unconstrained choice of local authorities. Lastly, variation in royalty flows—which is significant—is a function of fluctuations in international commodity prices and in the volumes of resources extracted, and thus independent of education and health sector performance.

Accordingly, royalties as a proportion of the 1994–2004 average current revenue should be highly correlated with Own Resources/Total Education or Health Expenditures, but little correlation with increases in student enrollment or health access. We use instrumental variable estimations.¹⁷ A Sargan test of over-identifying restrictions confirms that royalties as a proportion of the 1994–2004 average current revenue is a suitable instrument for the share of own resources in total education and health spending. Lastly, in order to control for possible endogeneity in municipal expenditure growth, we instrument it with the growth of exogenous transfers, as transfers grew according to a predetermined formula set by Laws 60 of 1993 and 715 of 2001. Both sets of results are presented below.

6 Evidence

Tables 1 and 2 report results from our estimation of Eq. (6) for education and health. Both panel (OLS) and instrumental variable estimations are listed, instrumenting for own resources with royalty income as a proportion of average current revenues in both sectors, and using an additional instrument¹⁸ that permits a Sargan test of overidentifying restrictions. The Sargan test confirms that instruments and residuals are uncorrelated, and royalties thus are associated with exogenous variation in own resources. The IV2 estimation instruments for own resources and expenditure growth. The Sargan test again corroborates the exclusion restriction condition.

6.1 Education

The first two measures of decentralization are positive and significant at the 1 % level throughout. This provides strong evidence that public school enrollment rises as the share of own resources in total education expenditure rises, and when municipalities are more independent of regional governments. IV estimates of both coefficients are similarly significant but larger in size—double for own resources—implying that OLS estimates are biased downwards and may be a lower bound estimate of the impact of own resources. The magnitude of the effect estimated is large. The coefficient implies that, *ceteris paribus*, a typical municipality that increases its share of education spending by one standard deviation will raise the growth rate of enrollment by almost its full mean value (equivalent to a 0.14 standard deviation increase; see data summary [Appendix](#)). These results are unaffected when we exclude the largest outliers of own resources/total expenditures as a robustness check.

¹⁷Note that the dependent variable is not censored/truncated. Observed “zeros” are real zeros, and not failures of measurement or excluded negative values. A 2SLS panel estimation therefore is appropriate. As a check, we also estimated the IV model with a Tobit first stage. The findings did not change.

¹⁸The second instrument used in the education equation is the land Gini coefficient, under the neoinstitutionalist assumption that the concentration of economic power affects the level of investment in public goods. In the case of health, the second instrument used is FARC guerrilla activity, under the assumption that a municipality confronted with illegal armed groups must divert resources from social to other types of spending, such as security and infrastructure reconstruction (Sánchez and Diaz 2007). Both instruments have the expected sign.

Table 1 Decentralization's effect on public school enrollments. Dependent variable: increase in public school enrollment (ln)

Independent variable	OLS	IV1 ⁺⁺	IV2 ⁺⁺⁺
<i>Decentralization variables</i>			
Own resources/ Total education expenditures	0.148 ^{****} (0.0198)	0.284 ^{***} (0.0524)	0.277 ^{***} (0.0564)
Municipal independence ⁺	0.0545 ^{***} (0.00731)	0.0664 ^{***} (0.00915)	0.0647 ^{***} (0.00957)
Statutory transfers (poverty)/ Total education expenditures	-0.0229 (0.0263)	0.00216 (0.0282)	0.0233 (0.0307)
Statutory transfers (No. of students)/ Total education expenditures	0.126 ^{***} (0.0413)	0.122 ^{***} (0.0395)	0.190 ^{***} (0.0462)
<i>Resource availability variables</i>			
Municipal expenditure growth	0.209 ^{***} (0.0124)	0.206 ^{***} (0.0127)	0.312 ^{***} (0.0231)
Student–teacher ratio (lagged)	-0.00173 ^{***} (0.000666)	-0.00181 ^{***} (0.000696)	-0.00223 ^{***} (0.000880)
Per capita expenditure on public education (ln, lagged)	-0.162 ^{***} (0.00989)	-0.167 ^{***} (0.0105)	-0.194 ^{***} (0.0141)
University graduates as a share of municipal personnel	0.0252 ^{**} (0.0101)	0.0207 ^{**} (0.0104)	0.0261 ^{**} (0.0109)
<i>Socioeconomic and geographic variables</i>			
Population (ln)	-0.0214 ^{***} (0.00260)	-0.0214 ^{***} (0.00253)	-0.0239 ^{***} (0.00263)
Unsatisfied basic needs	0.000367 ^{***} (7.77e-05)	0.000381 ^{***} (7.78e-05)	0.000333 ^{***} (8.01e-05)
Unemployment rate (departmental)	-0.0411 ^{**} (0.0191)	-0.0415 ^{**} (0.0191)	-0.0379 ^{**} (0.0184)
Displaced population, receiving municipalities	-0.0891 (0.143)	-0.0780 (0.145)	-0.106 (0.143)
Displaced population, expelling municipalities	-0.181 ^{***} (0.0629)	-0.175 ^{***} (0.0629)	-0.154 ^{**} (0.0601)
Public school gross enrollment rate (% of school-age population, lagged)	-0.0492 ^{***} (0.00623)	-0.0506 ^{***} (0.00632)	-0.0509 ^{***} (0.00642)
Private enrollment rate (% of school-age pop. in private schools) (ln, lagged)	0.390 ^{***} (0.125)	0.354 ^{***} (0.120)	0.345 ^{***} (0.119)
Constant	2.480 ^{***} (0.155)	2.541 ^{***} (0.162)	2.947 ^{***} (0.213)
<i>F-test for instruments</i>			
F-test for instruments of own resources/Total education expenditures ⁺⁺		24.89	62.66
Prob > F		0.000	0.000
F-test instruments of municipal expenditure growth ⁺⁺⁺			23.42
Prob > F			0.000

Table 1 (Continued)

Independent variable	OLS	IV1 ⁺⁺	IV2 ⁺⁺⁺
Endogeneity test Chi-sq(l) p-value		4.47	4.28
		0.034	0.03
Sargan statistic Chi-sq(l) p-value		0.89	1.642
		0.3452	0.2
Year fixed effects (1995–2004)	yes	yes	yes
Department fixed effects	yes	yes	yes
Clusters by municipality	yes	yes	yes
Observations	10,553	10,478	10,473
Groups	1081	1081	1081

Panel regressions with robust standard errors; standard errors in parentheses; clusters correct for serial correlation

*, **, *** = coefficients significant at the 10 %, 5 % and 1 % levels

⁺ No. municipalities above 100,000 inhabitants certified as “independent”

⁺⁺ IV1 instruments for Own resources/total education expenditures with Royalties/average current revenues and the Gini of land values

⁺⁺⁺ IV2 instruments for Own resources/total education expenditures and Municipal expenditure growth with Royalties/average current revenues, Gini of land values and Growth of exogenous transfers

The first negative measure of decentralization produces coefficients equal to zero throughout, while the fourth variable is positive and significant at the 1 % level, but smaller than own resources throughout. The difference between these coefficients becomes quite large in the IV models: the coefficient on own resources is more than twice that of statutory transfers in IV1 and also significantly larger in IV2. This implies that where central transfers form a large part of total expenditures and municipalities thus face strong incentives set by the center, public enrollment increases, but at a much slower rate than where own resources dominate. We interpret these results as evidence that decentralization of education has led to improved educational outcomes in Colombia, in the sense of more students attending school. By contrast, outcomes have improved much more slowly in those places where central and regional controls persist.

Supply-side measures of resources availability are mostly significant at the 1 % level. They show that enrollment increases as expenditure grows, and falls as the (lagged) student–teacher ratio rises, as one would expect. Instrumenting expenditure growth does not alter these results. Curiously, the per capita expenditure term is also negative. This offers additional evidence that raising student numbers is not a simple question of expanding the education budget, but rather depends on other factors related to the quality of spending, and allied decision-making about education policy. IV estimates of these coefficients are of very similar size, and retain their significance. Enrollment also rises with the quality of local government’s human resources in all three models.

Amongst socioeconomic and geographic controls, results of interest include the first three coefficients, implying that districts that are smaller, poorer, and suffer less unemployment saw larger enrollment increases. These results are significant at the 1 % or 5 % levels. Other control variables capturing the impact of forced migration due to Colombia’s armed violence, and enrollment level effects, are also significant and unsurprising. Perhaps most interesting of this last group of results is that public enrollment rises with the share of students

Table 2 Decentralization's effect on access of the poor to health care. Dependent variable: increase in health insurance amongst the poor (ln)

Independent variable	OLS	IV1 ⁺⁺	IV2 ⁺⁺⁺
<i>Decentralization variables</i>			
Own resources/ Total health expenditures	0.726 ^{***} (0.138)	4.384 [*] (2.525)	4.149 [*] (2.333)
Municipal independence ⁺	0.0840 ^{***} (0.0263)	0.126 ^{***} (0.0434)	0.119 ^{***} (0.0395)
Statutory transfers (poverty)/Total health expenditures	0.0846 ^{**} (0.0396)	0.198 ^{**} (0.0866)	0.255 ^{**} (0.122)
Statutory transfers (No. of insured persons)/Total health expenditures	-0.189 ^{***} (0.0561)	-0.347 ^{**} (0.143)	-0.323 ^{**} (0.129)
FOSYGA/Total health expenditure	0.0309 (0.0352)	0.0773 (0.0481)	0.106 [*] (0.0627)
<i>Resource availability variables</i>			
Municipal expenditure growth	0.0477 ^{***} (0.0147)	0.0376 ^{**} (0.0179)	0.119 ^{**} (0.0537)
Per capita expenditure on public health (ln, lagged)	0.00603 (0.00802)	0.00202 (0.00942)	0.0149 (0.0113)
University graduates as a share of municipal personnel	-0.00258 (0.0164)	-0.0324 (0.0283)	-0.0293 (0.0268)
<i>Socioeconomic and geographic variables</i>			
Population (ln)	0.0287 ^{***} (0.00255)	0.0361 ^{***} (0.00574)	0.0374 ^{***} (0.00656)
Unsatisfied basic needs	0.000353 ^{***} (0.000110)	0.000325 ^{**} (0.000145)	0.000325 ^{**} (0.000144)
Unemployment rate (departmental)	-0.0597 ^{***} (0.0219)	-0.0102 (0.0426)	-0.0111 (0.0412)
Displaced population, receiving municipalities	-0.178 (0.121)	-0.162 (0.129)	-0.153 (0.132)
Displaced population, expelling municipalities	-0.0790 (0.0569)	-0.0504 (0.0598)	-0.0596 (0.0585)
Health insurance coverage amongst the poor (lagged)	-0.0311 ^{**} (0.0126)	-0.0277 ^{**} (0.0117)	-0.0369 ^{***} (0.0129)
Constant	-0.160 (0.102)	-0.236 [*] (0.132)	-0.398 [*] (0.205)
<i>F-test for instruments</i>			
F-test instruments for own resources/total health expenditures ⁺⁺ Prob > F		2.69 0.0684	6.94 0.0001
F-test instruments of municipal expenditure growth ⁺⁺⁺ Prob > F			1977.23 0.000
Endogeneity test Chi-sq(1) p-value		7053 0.0079	7147 0.0075

Table 2 (Continued)

Independent variable	OLS	IV1 ⁺⁺	IV2 ⁺⁺⁺
Sargan statistic Chi-sq(1) p-value		0.025 0.8740	0.002 0.9657
Year fixed effects (1999–2004)	yes	yes	yes
Department fixed effects	yes	yes	yes
Clusters by municipality	yes	yes	yes
Observations	6265	6265	6265
Groups	1068	1068	1068

Panel regressions with robust standard errors; standard errors in parentheses; clusters correct for serial correlation

*, **, *** = coefficients significant at the 10 %, 5 % and 1 % levels

⁺ No. municipalities above 100,000 inhabitants certified as “independent”

⁺⁺ IV1 instruments for Own resources/total health expenditures with Royalties/average current revenues and FARC attacks

⁺⁺⁺ IV2 instruments for Own resources/total health expenditures and Municipal expenditure growth with Royalties/average current revenues, FARC attacks and Growth of exogenous transfers

attending private schools, indicating complementarity between the public and private education systems. This contradicts the impression of substitution between public and private enrollment implied in Fig. 4. Decentralization appears not to improve public schooling at the expense of private schools, but rather to promote the idea of education more generally.

6.2 Health

Our first two indicators of decentralization are positive and highly significant for health, but much larger in size than education, implying that municipal autonomy has an even larger effect in the health sector. Both coefficients increase in the IV models, dramatically so in the case of own resources. The IV1 coefficient implies that, *ceteris paribus*, a typical municipality that increases its share of health expenditure by one standard deviation will expand health insurance coverage by almost twice its average value for all Colombian municipalities (equivalent to one standard deviation). In this sense, the effect of local financial effort is significant. These results are similarly unaffected when we exclude the largest outliers of own resources/total expenditures as a robustness check.

Statutory central transfers, a negative indicator of decentralization, are positive when linked to poverty but negative when linked to the number of insured. The negative coefficients are larger than the positive ones, implying that centrally controlled statutory transfers on average reduced the poor's access to health care (mean transfer values confirm this). This is a notable and surprising result, especially given that the negative effect is due to central transfers specifically designed to increase access to health. FOSYGA—the central government's most important means for funding and monitoring the local health system—is insignificant in all but one estimation, implying that central government's most important health policy has little or no effect on municipal outcomes.

Overall these results are even starker than those for education. By far the largest effect is from our most important measure of decentralization. It implies that as municipalities fund more healthcare from resources over which they have free disposal, health coverage of the

poor increases strongly. Greater municipal autonomy from regional interventions expands healthcare access further. Central transfers linked to poverty and the number of insured have opposing impacts on coverage, with the negative impact dominating.

Amongst measures of resource availability, only municipal expenditure growth is significant (1 %) and positive, as one would expect. This effect is replicated throughout, and also holds when we instrument for expenditure growth (IV2). Per capita expenditures on health (lagged) are essentially insignificant, implying again, although weakly, that expanding health coverage is not simply a matter of more funding. The quality of local government's human resources appears to have no effect in health.

The most interesting of the socioeconomic and geographic controls reflects a finding for education: health coverage rises with unsatisfied basic needs, implying that coverage grew faster in poorer municipalities. Unlike education, coverage is greater in larger municipalities, perhaps reflecting indirectly the economies of scale available in health care. Of the remaining control variables, only level effects of insurance coverage are clearly significant, and unsurprising. There is some evidence that access worsens with the unemployment rate, as one might expect. All other terms are insignificant.

7 Conclusions

The evidence implies that one of the most powerful and frequently cited arguments in the literature—that decentralization can improve the quality of public services, and hence the flow of benefits to citizens—held true for the case of Colombia. In districts where educational finance and policy making were most under the control of local authorities and most free of central and regional influences, enrollment increased strongly. In districts where educational finance was still based on centrally and regionally controlled criteria, enrollment increases were between one-half and three-fifths smaller. These results control for the level of expenditure. Decentralization thus raised enrollment rates in public schools. It is striking that these changes were even more marked in poorer, smaller municipalities.

The evidence is similar for health. Where services were financed more out of local revenues over which local authorities have free disposal, health coverage of the poor increased strongly. Indeed, coverage in the Andean region approached 90 % by 2004, a result that some far richer countries might justifiably envy. In districts where health was financed more out of central government transfers, by contrast, access to health stagnated or fell. These municipalities missed out on the gains that more decentralized municipalities enjoyed, and some actually worsened. As for education, coverage rose more strongly amongst poorer municipalities. For both sectors, our results are robust to alternative specifications.

In both sectors, the large effects of relatively small changes in own-shares of spending is notable. We interpret this as the product of two factors: (i) the greater responsiveness elected of local governments, which are able to identify public goods with high marginal impact; and (ii) the greater accountability that comes from financing outlays out of local citizen's pockets, which in turn tends to generate higher efficiency of public expenditure. For both sectors, expanding access is not a simple matter of providing more resources. The coefficient on per capita expenditures is negative for education and essentially zero for health. Throwing money at the problem of access does not solve it. It is, rather, how and by whom the money is spent that seems to matter—the quality, not the quantity, of public expenditure. These results coincide with new evidence from Brazil (Gonçalves 2013) showing that participatory budgeting shifts resources amongst sectors and lowers infant mortality rates without increasing overall expenditures. They also echo the findings of Clark (2009), Escaleras and

Register (2012), and Faguet (2012) that decentralization can improve government responsiveness to local needs.

These findings are consistent with our theoretical results. The typical dynamic in a decentralized system is that central government announces nationwide policies and programs, and the budget allocations these entail. Local government observes these and then chooses how to allocate its own resources locally. Our model shows that for services where local information trumps productive efficiency ($\tau < \alpha$), elected local governments will provide services better tailored to local needs and conditions. In places where the provision of such services is more decentralized, we can expect public use (access) to increase more. This is indeed what happened.

The combination of empirical and theoretical results implies that decentralization is generating accountability in local government throughout much of Colombia. Electoral competition and local democracy provide local officials with the information and incentives they need to allocate their own resources in a manner responsive to voters' needs, and improve the quality of expenditure so as to maximize impact. It is not surprising that the end result of this process is greater usage of local services by local citizens, who thus receive more benefits from public expenditure. These findings contradict common claims that local government is too corrupt, institutionally weak, or prone to interest-group capture to improve upon central government's allocation of public resources.

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Appendix: Data summary

Variable*	Obs.	Mean	Std. Dev.	Min.	Max.
<i>Education (1994–2004)</i>					
Increase in student enrollment in public schools (ln)	10553	0.0238	0.1091	−0.5214	1.5224
Own resources/Total education expenditures	10559	0.0406	0.0731	0	0.9938
Municipal independence	10559	0.0117	0.1045	0	1
Statutory transfers (poverty)/Total education expenditures	10559	0.1744	0.1344	0	0.6580
Statutory transfers (No. of students)/Total education expenditures	10559	0.0351	0.0732	0	0.9960
Municipal expenditure growth	10559	0.0537	0.1688	−0.7263	1.8967
Per capita expenditure on public education (ln)	10559	13.7073	0.3643	11.8198	15.5100
Student/Teacher ratio (lagged)	10559	22.3558	9.1899	0	446.0
University graduates as a share of municipal personnel	10559	0.0696	0.1008	0	0.8937

Variable*	Obs.	Mean	Std. Dev.	Min.	Max.
Population (ln)	10559	9.6355	1.0456	6.3297	15.7657
Unsatisfied basic needs	10559	45.3104	22.2733	1.1293	105.2663
Displaced population, receiving municipalities	10559	0.0014	0.0087	0	0.3503
Displaced population, expelling municipalities	10559	0.0056	0.0245	0	0.7788
Unemployment rate (departmental)	10559	0.1270	0.0849	0.03	0.9990
Public-school gross enrollment rate (lagged) (% of school-age population)	10559	0.9720	0.3906	0.1	2.5000
Private enrollment rate (% school-age pop. in private schools) (ln, lagged)	10559	0.0133	0.0266	0	0.4532
Per capita local taxes (ln)	10559	-4.4642	1.2134	-9.3527	-0.5045
<i>Health (1997–2004)</i>					
Increase in health insurance amongst the poor (ln)	6266	0.0829	0.1732	-0.4976	2.4013
Own resources/Total health expenditures	6267	0.0090	0.0321	0	0.8778
Municipal independence	6267	0.0070	0.0800	0	1
Statutory transfers (poverty)/Total health expenditures	6267	0.1340	0.1500	0	0.7360
Statutory transfers (No. of insured poor)/Total health expenditures	6267	0.2600	0.0900	0	0.9180
Municipal expenditure growth	6267	0.0308	0.2179	-0.6820	3.1490
Per capita expenditure on public health (ln)	6267	11.9546	0.5395	8.9660	14.5126
University graduates as a share of municipal personnel	6267	0.0695	0.1010	0	0.8937
Population (ln)	6266	9.6477	1.0588	6.3297	15.7657
Unsatisfied basic needs	6267	42.8152	22.6682	1.1293	104.2634
Displaced population, receiving municipalities	6267	0.0023	0.0112	0	0.3503
Displaced population, expelling municipalities	6267	0.0090	0.0313	0	0.7788
Unemployment rate (departmental)	6267	0.1417	0.0795	0.050	0.9990
% coverage of public health insurance	6267	0.5915	0.4981	0.025	6.8081
Per capita local taxes (ln)	6262	0.0071	0.0239	0.000	0.5450

*Municipal-level expenditure data for education are available from 1994, but only from 1997 for health. Hence we separate data summaries by sector and time periods

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