

Chapter 3

Fiscal Decentralization and Health: A Case of China¹

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Abstract

This study analyzes the effect of fiscal decentralization on health outcomes in China using a panel data approach with nationwide county-level data. We find that more decentralized counties have lower infant mortality rates compared with those counties in which the provincial government plays an important role, if certain conditions are met. Most important is the county government's own fiscal capacity as well as the mapping of resources to needs through transfers. These findings support the common assertion that fiscal decentralization can indeed lead to more efficient production of local public goods, but also highlights the necessary conditions to make this happen.

¹ This is the product of the joint study conducted by the Institute of Developing Economies-Japan External Trade Organization (IDE-JETRO) and the Organisation for Economic Co-operation and Development (OECD).

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1. Introduction

Fiscal decentralization has become a major trend worldwide. The literature highlights the allocative benefits of transferring authority and resources from central to local tiers of government for the provision of local public goods (Dethier, 1999; Bardhan, 2002). In particular, in developing countries where considerable attention is given to the achievement of the Millennium Development Goals (MDGs), hope exists that fiscal decentralization can improve access to health care and other social services. How? In a nutshell, two main arguments are discussed in the theoretical literature: First, local governments have an information advantage vis-à-vis the central government that allows them to provide public goods more efficiently (Hayek, 1945). Second, citizens can “vote with their feet”. They will select a local jurisdiction that best balances their aspiration for local public goods and the tax level that goes with it. Over time, competition for citizens between the different local jurisdictions will drive down costs for the production of local public goods and services (Tiebout, 1956). Drawing on these experiences, Musgrave (1959) and Oates (1972) developed a theory of fiscal federalism that provides guidelines for the assignment of taxes and expenditures to the various levels of government to improve overall welfare.

China is a very interesting case study to test whether fiscal decentralization indeed leads to improved production of local public goods and services. China, with its large size and population, is one of the most decentralized countries in the world measured in terms of spending authority assigned to the local governments. The health sector is a particularly interesting sector for assessing the impact of fiscal decentralization on public goods. It has been undergoing reform for roughly 30 years, with considerable changes in the provision and financing of health care services. What makes the Chinese experience somewhat unique worldwide is its depth of fiscal decentralization in terms of expenditure, in contrast with the revenue side that has been recentralized since a major reform in 1994. Moreover, and contrary to other experiences in developing countries, there has been no political decentralization: local government officials are not accountable to the local electorate but to higher level government officials. In a nutshell, Chinese-style fiscal federalism deviates considerably from the textbook case and thereby may yield quite different results.

Most studies on the impact of fiscal decentralization in China have used province level data (e.g., Jin, Qian and Weingast, 2005). Among these, several studies pointed to increasing spending inequalities among Chinese provinces that translate into widening spatial inequalities in access to health care (OECD, 2006; Kanbur and Zhang, 2003). Jin and Zou (2005) examined the fiscal relationship between central and provincial governments in China. They used the relative importance of the provincial government on the revenue side and the expenditure side as fiscal decentralization indicators, and analyzed the impacts of fiscal decentralization on economic growth. In addition, Zhang (2006) analyzed the influence of fiscal decentralization on regional growth as well as inequality in China. He focused on fiscal decentralization below the province level by using county-level fiscal data.

In this paper, we employ panel data analysis using county-level data to estimate the impact of fiscal decentralization on health outcomes. In particular, this allows us to address the development within provinces. Counties as intermediaries between central/province and townships are highly important to health care provision and thereby influence health outcomes. Two key questions guide our analysis. First, do more decentralized county governments perform better, measured in terms of lower infant mortality rates, compared with those counties in which provinces play larger roles in the provision of public services? Second, what role do intergovernmental transfers play in explaining different health outcomes?

The remainder of this paper is organized as follows: the next section provides a short theoretical snapshot of fiscal decentralization and health outcomes with reference to the Chinese context. Section 3 presents the data used and descriptive statistics, while section 4 presents the results of the empirical analysis. The last section presents preliminary policy implications and the conclusion.

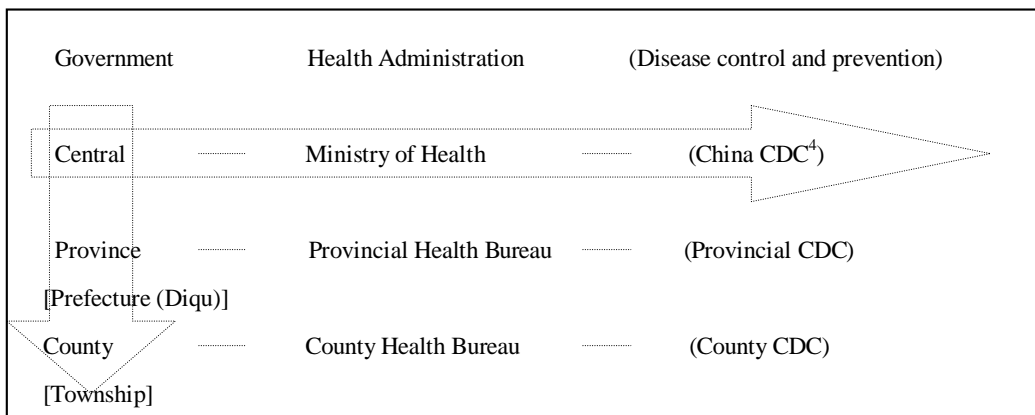
2. A simple framework: Fiscal decentralization and health

The administrative structure of the health sector in China is presented in a stylized way in Figure 1. The vertical line of ‘Government’ represents the alignment from the central government to lower tiers of government. The same vertical alignment is applied to health sector administrations. The horizontal line shows the linkage

between the government and health administrative organizations at each level of government: central, province and county.

This structure also reflects the direction of flows in the system. Public funds for health flow from the upper tiers to the lower tiers of government, and from the upper tiers to the lower tiers of the health administration (vertical arrow). In addition, public funds for health flow from the government to health organizations at each level of government (horizontal arrow).

Figure 1 The Administrative and Fiscal Structure of the Health Sector



Note: Authors' compilation.

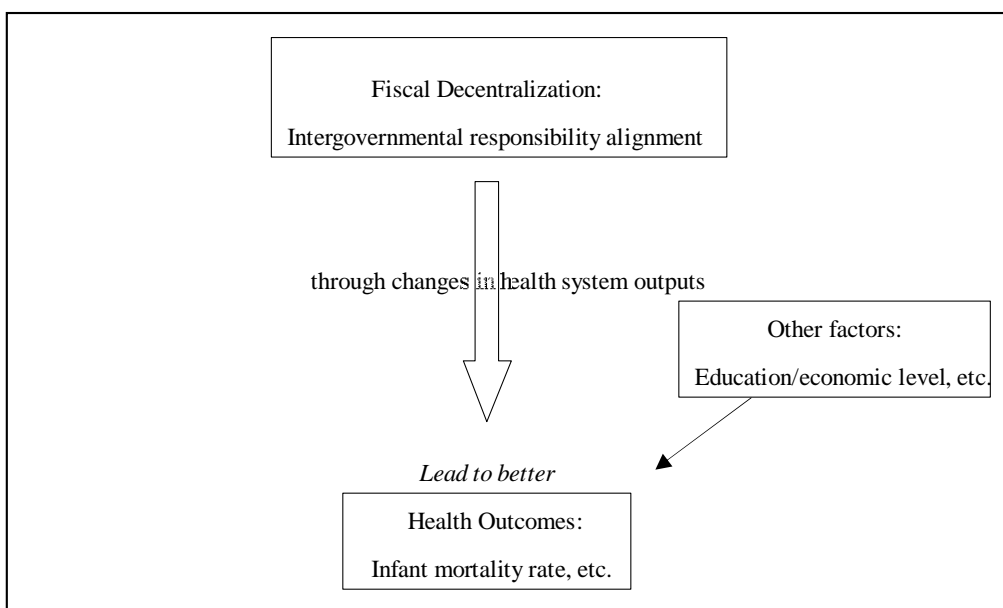
The central and provincial governments are responsible for the broader policy and strategic design, and investment in the larger health infrastructure, whereas the counties have practical responsibilities for implementing health programs or services. There are more than one hundred counties in large provinces such as Hebei and Sichuan. The fiscal or institutional capacity of the county government is critically important for the provision of appropriate health services, and ultimately for achieving better health outcomes for the local people.

Figure 2 presents a simple framework that links fiscal decentralization to health outcomes. Following the conventional thinking on fiscal decentralization and its relationship to the provision of a local public good, the following stylized chain of

⁴ China CDC is formally the Chinese Center for Disease Control and Prevention, which was created in 2002 (Peng et.al, 2003).

interaction can be established. Fiscal decentralization assigns more financial responsibility for health service provision to lower tiers of government—in the Chinese case, to the county level. This will bring about responsive/efficient service provision because lower tiers of government can more efficiently provide health care services as they know better the preferences of their citizens. Local government with a “helping hand” (Shleifer and Vishny, 1998) will further invest in and develop the health system, which will lead in the medium to long run—in conjunction with other measures such as improved education—to improved health outcomes.

Figure 2 The Linkage between Fiscal Decentralization and Health



Several caveats exist with this line of argument. First, an implicit assumption in the standard approach to fiscal federalism is that local governments are responsive to the needs of voters. However, in China, local government officials are generally not elected and hence may not be responsive to local needs and preferences. Local government officials might be more interested in supporting local business development than in investing in the provision of social services, in particular, low cost primary health care. In fact, local governments might play the role of a “grabbing hand” by investing more in the provision of more profitable tertiary health care such as expensive hospitals

instead of in the further development of primary health care. All this may make the standard Tiebout model inapplicable. Second, the provision of health care services with interjurisdictional spillover effects such as immunization might suffer in a decentralized setting as local governments have less incentive to provide such services. Third, designing a functioning intergovernmental fiscal transfer system that compensates for different revenue capacities is a challenge. Conditional transfer will reduce the expenditure management (decision-making) autonomy of the local government, which would weaken the responsiveness of public services provided by the local government. In contrast, unconditional transfer would reduce the incentives for the local government to manage funds efficiently (de Mello, 2000).

Hence, it is an empirical question whether fiscal decentralization leads to an improvement in health outcomes and whether fiscal transfers can play a smoothing role.

3. Variables and data sources

Variables⁵

The following variables are used in the empirical analysis.

Dependent variable

The dependent variable in our model is health outcome measured by provincial infant mortality rates per thousand live births (IMR).

Explanatory variables

Our explanatory variables fall into two categories: the first is fiscal decentralization, which is of most interest in this study, and the second is socioeconomic characteristics that might affect health outcomes. We do not include variables that capture health expenditures at the county level in our models because of data limitations. The health output variables, such as the number of hospitals/doctors, are not included in the model, because we concentrate on examining the impact of fiscal decentralization on health outcomes, which has rarely been studied.

1) Fiscal decentralization indices⁶

⁵ Descriptions of variables are summarized in Table A1 in the Appendix.

To quantitatively examine fiscal decentralization below the province level, we use the following two indicators: vertical balance (*VB*) and the ratio of county expenditure to total provincial expenditure (*RCE*). The two indicators are defined as follows:

Vertical balance (*VB*):

$$VB_j = \frac{\sum_i CE_{i,j}}{\sum_i COR_{i,j}} \quad (1),$$

where *j* denotes province and *i* denotes county. *CE_{i,j}* is county expenditure and *COR_{i,j}* is the county's own revenue at province (*j*). Hence, the numerator is counties' expenditures aggregated at the provincial level, and the denominator is counties' own revenues aggregated at the provincial level. Accordingly, *VB_j* is the ratio of aggregate counties' expenditure to aggregate counties' own revenues in a given province (*j*).

If *VB_j* is greater than one, aggregate county outlay exceeds aggregate county own revenue in province (*j*). This indicates a fiscal gap in the counties that must be filled with intergovernmental transfers, including various kinds of subsidies. On the other hand, if the *VB* is less than one, the revenues at the county level are sufficient to pay for the assigned expenditures. Hence, the vertical balance is a good indicator of whether the expenditure assignments of the counties in a province need transfers from the provincial or central government.

Ratio of county expenditure to total provincial expenditure (*RCE*):

$$RCE_j = \frac{\sum_i CE_{i,j}}{TPE_j} \quad (2),$$

where *TPE_j* denotes total provincial expenditure, which includes aggregate *CE_{i,j}* in province (*j*) and the expenditure of the provincial government (*j*).⁷ Thus, *RCE_j* is always less than unity. It measures the ratio of aggregate counties' expenditure in province (*j*) to

⁶ Other studies that applied similar fiscal decentralization indices exist, but they mostly examined the relationship between the central government and subnational (second-tier) governments (de Mello, 2000; Lindaman and Thurmaier, 2002; Jin and Zou, 2005). Zhang (2006) studied fiscal decentralization below the province level in China, but fiscal decentralization indicators are not applied in this study.

⁷ In addition, *TPE* includes the expenditure of the prefecture (Diqu), the administrative/governmental characteristics of which differ significantly between provinces.

the total fiscal expenditure of province (j), and captures the relative importance of counties as public service providers. This indicator is also important in capturing the extent of fiscal decentralization below the province level. As observed below, this ratio varies across provinces in China, which means that fiscal expenditure is more decentralized to the county level in some provinces than in others.

2) Socioeconomic characteristics

Social characteristics are measured by education level and fertility rate at the province level. The provincial illiteracy rate (aged 15 and over) is the percentage ratio of the number of illiterates to the total population aged 15 and over, which is used in our model as a proxy of the education level. The fertility rate is measured by the provincial birth rate, which is the ratio of the number of births to the average population in the province (times 1000 (%)).

Economic characteristics are measured by the economic level of the province and the size of the provincial government. Economic level is measured by the provincial per capita GDP, and provincial government size is measured by provincial total fiscal expenditure relative to provincial GDP. The rural/urban ratio captures both social and economic characteristics of the province, and is measured by the ratio of rural people to urban people in the province.

Data Sources

To measure the fiscal decentralization indicators, we use county government fiscal expenditure, the county government's own revenue,⁸ and total fiscal expenditure at the province level. The source of the county data is *Prefecture and County Level Public Finance Statistics* (Quanguo Di Shi Xian Caizheng Tongji Ziliao). The provincial data is from the *Finance Year Book of China*, and the *China Statistical Yearbook*. Provincial infant mortality rates have been supplied by the Beijing Center Disease Prevention and Control.⁹

The provincial illiteracy rate for the population aged 15 and over is calculated

⁸ We include tax refunds in counties' own revenue because the fiscal characteristics of tax refunds in the Chinese sense define them in this way rather than as transfers (see OECD (2006) for details of the fiscal system).

⁹ The dataset is available from the authors upon request.

from the *China Population Statistics Yearbook*. Provincial per capita GDP is from the *China Compendium of Statistics*. The provincial birth rate and the ratio of rural to urban people in provinces are also calculated from the *China Compendium of Statistics*.

4. Quantitative analysis

This study employs the above defined fiscal decentralization indicators to capture fiscal decentralization below the province level in China. We use panel data that cover twenty-six provinces for seven years (1995 to 2001) for our quantitative analysis.¹⁰

Descriptive Analysis

Table 1 Descriptive Statistics of Major Variables

	Obs	Mean	Std. Dev.	Min	Max
IMR	182	21.96	9.34	8.99	50.28
VB	182	1.36	0.37	0.77	2.59
RCE	182	0.45	0.08	0.21	0.61
Economic level	182	6031.7	2705.3	1853.0	14655.0
Rural/urban ratio	182	2.44	1.20	0.23	6.24
Birth rate	182	15.29	8.25	7.70	115.00
Illiteracy rate	182	16.75	8.16	5.07	51.45

Table 1 reports descriptive statistics of our panel dataset. The infant mortality rate (IMR) varies across provinces and over the years. The lowest IMR (8.9) is for Zhejiang province in 2001, and the highest (50.2) is for Qinghai province in 1996. The

¹⁰ Our dataset does not include Tibet, Beijing, Tianjin and Shanghai because of their exceptionality. County expenditure in Tibet depends greatly on resources from upper tiers of the government. Its vertical balance (seven-year average) is 5.7, which means Tibet's county expenditure is almost six times as much as its own revenue. This level is exceptionally high compared with other provinces. Regarding Beijing, Tianjin, and Shanghai, their county expenditure ratio (seven-year, three-province average) is 8.3%, which is very low compared with other provinces. As they are large province-level municipalities, they might differ from other provinces in terms of administration or fiscal treatment. Hence, we exclude these three provinces as well as Tibet from our dataset. Since 1997, Chongqing has also been one of the large province-level municipalities. Thus, we do not include Chongqing in our data set from 1997 to 2001. Before 1997, Chongqing was included in Sichuan province as one of the districts in Sichuan. Thus, our dataset for 1995 and 1996 reflects this situation.

lowest is much better than the IMR in other Asian countries—for example, the IMR of the Philippines was 30.0 in 2000. However, the highest IMR (50.2) is worse than those of other Asian countries—for example, Indonesia’s IMR was 48.0 in 1995. Socioeconomic characteristics also differ between provinces and over the years. It is now well known that significant economic differences exist between provinces in China. In addition, our observations indicate that social characteristics, such as education level, differ across provinces and over the years. Table 2 shows that both VB and RCE differ between provinces. As these are our most interesting variables, more details will be reported in the following.

Figure 3 VB and RCE in 2000

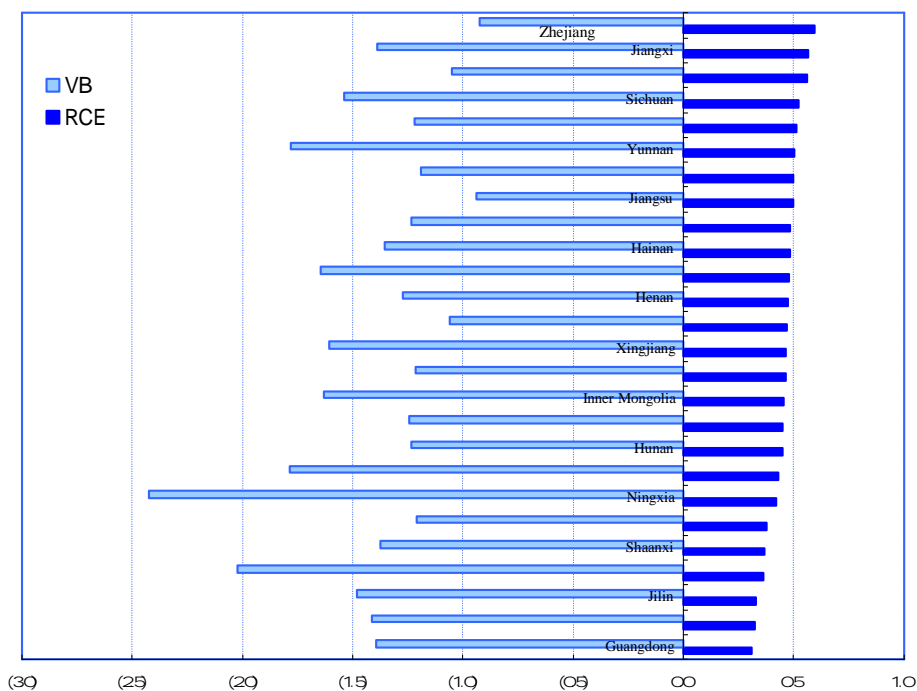


Figure 3 provides the VB and RCE of 26 provinces in 2000. The VB is more than one in most of the provinces, which means that counties in most of the provinces depend on intergovernmental fiscal transfers to carry out their responsibilities. We

confirm that the degree of VB varies across provinces. The province–county fiscal relationship differs between provinces in China.¹¹ In addition, we do not find any particular trend between the VB and the RCE. The ratio of county expenditure covered by intergovernmental transfers is high in some provinces; however, the RCE (the relative importance of counties to province) is not necessarily high in the provinces. For instance, Figure 3 shows that Zhejiang has the highest RCE of the provinces, which means that its county expenditures are high relative to the total province expenditure; however, Zhejiang’s VB is not very high compared with other provinces. The RCE of Guangdong is the lowest of the provinces, but Guangdong’s VB is higher than that of Zhejiang. This suggests that counties in some provinces may have a relatively high fiscal capacity, whereas other counties may suffer from fiscal shortages compared to their responsibilities.

Empirical Analysis

To empirically assess the question of whether and under which conditions fiscal federalism, Chinese style, improves health outcomes, we apply a fixed-effect model with the following structure to our panel dataset:

The basic model is:

$$y_{it} = \alpha + \beta X + \gamma C + v_{it} \quad (3),$$

where i indexes the province and t is time. X denotes the two fiscal decentralization indicators and C denotes the control variables. y is the provincial infant mortality rate and v is an error term. We apply a fixed-effect model for our analysis and, hence, the estimation model is:

$$y_{it} = \alpha + \beta X + \gamma C + \mu_i + u_{it} \quad (4),$$

where μ_i is the unit-specific residual: it differs between units (provinces) but it is time

¹¹ Note that differences in the extent of fiscal decentralization below the province level (the province–county relationships) do not necessarily relate to the economic level or the geographical patterns of the provinces (OECD, 2006).

invariant. It captures the unit-specific characteristics that do not change over time. In our model, the unit-specific characteristics can be considered to be provincial geographical characteristics, etc. The fixed-effects model is also supported by model tests.¹²

To examine the impact of fiscal decentralization below the province level on health outcomes, we examine two sets of models that focus on vertical balance and the relative importance of the county, respectively (Table 2).

Models (a–c) $IMR = f(VB, Econ, Rural, Fer, Edu)$ (5),

where IMR is the provincial infant mortality rate, which is our dependent variable (health outcome), VB is the aggregate county vertical balance, $Econ$ denotes the economic level of the province measured by provincial per capita GDP and $Rural$ denotes the ratio of rural people to urban people in the province. Fer denotes the fertility rate, and Edu is the illiteracy rate of the province, which is a proxy of the education level. In the first set of models, we focus on the effect of vertical balance on health outcomes. Model (b) includes the RCE to control the influence of the relative importance of the county. The intersection term of VB and RCE is included in model (c) to examine the interaction effect between them on health outcomes.

Models (d–g) $IMR = f(RCE, Econ, Rural, Fer, Edu)$ (6),

where RCE denotes aggregate county expenditure to total provincial expenditure. In this set of models, we examine the effect of the relative importance of the county government compared with the provincial government on health outcomes. The coefficient of RCE will be interpreted as the effect of the relative importance of the county government on IMR clearly in model (e) because the influence of the denominator of RCE is controlled by including provincial government size as a control variable. Model (f) includes the intersection term of VB and RCE , and model (g) includes both the intersection term and provincial government size.

We need to heed the interpretation of models including the intersection term.

¹² The model is tested by an F-statistical test and the Hausman test, which support the fixed-effects model.

The estimation equations of models (a) and (d) are, respectively:

$$\ln(IMR_{it}) = \alpha + \beta_1 \ln(VB) + \gamma C + \mu_i + u_{it} \quad (7),$$

$$\ln(IMR_{it}) = \alpha + \beta_1 \ln(RCE) + \gamma C + \mu_i + u_{it} \quad (8).$$

β is interpreted as the elasticity of RCE or VB to the infant mortality rate, which is fixed as β_1 .

The estimation equations of models (c), (f) and (g) are, respectively:

$$\ln(IMR_{it}) = \alpha + \beta_1 \ln(VB) + \beta_2 \ln(RCE) * \ln(VB) + \gamma C + \mu_i + u_{it} \quad (9),$$

$$\ln(IMR_{it}) = \alpha + \beta_1 \ln(RCE) + \beta_2 \ln(RCE) * \ln(VB) + \gamma C + \mu_i + u_{it} \quad (10).$$

In these models, the intersection term allows the elasticity to vary. The elasticity of VB to IMR is $\frac{\partial \ln IMR}{\partial \ln(VB)} = \beta_1 + \beta_2 * \ln(RCE)$. Likewise, the elasticity of RCE to IMR is $\frac{\partial \ln IMR}{\partial \ln(RCE)} = \beta_1 + \beta_2 * \ln(VB)$. Therefore, the elasticity varies depending on the value of VB or RCE .

Table 2 Impact of Fiscal Decentralization on Health Outcomes¹³

Dependent variable	Infant Mortality Rate (ln)		
	(a)	(b)	(c)
Independent variable			
(a) VB: Vertical balance (ln)	-0.191 (-2.20)*	-0.23 (-2.57)**	-0.206 (-1.33)
(b) RCE: Ratio of county govt expenditure (ln)		-0.187 (-3.27)**	
(c): Intersection term: (a) * (b)			-0.018 (-0.11)
Per capita GDP (ln)	-0.221 (-2.43)*	-0.236 (-2.59)**	-0.221 (-2.45)*
Rural/urban ratio	0.0159 (0.74)	0.0078 (0.38)	0.0156 (0.72)
Birth rate	0.0037 (4.21)**	0.0035 (4.08)**	0.0037 (4.22)**
Illiteracy rate	0.0089 (4.49)**	0.0084 (4.35)**	0.0089 (4.44)**
Provincial govt size			
Number of observations	182	182	182
Number of groups	26	26	26
R ² within	0.503	0.522	0.503

Dependent variable	Infant Mortality Rate (ln)			
	(d)	(e)	(f)	(g)
Independent variable				
(a) VB: Vertical balance (ln)				
(b) RCE: Ratio of county govt expenditure (ln)	-0.161 (-2.81)**	-0.165 (-2.69)**	-0.271 (-4.12)**	-0.206 (-2.91)**
(c): Intersection term: (a) * (b)			0.3533 (3.09)**	0.1321 (1.09)
Per capita GDP (ln)	-0.313 (-3.74)**	-0.163 (-2.07)*	-0.217 (-2.45)*	-0.141 (-1.68)
Rural/urban ratio	0.0183 (0.84)	0.0214 (1.10)	0.0097 (0.47)	0.0179 (0.92)
Birth rate	0.0038 (4.36)**	0.0036 (4.18)**	0.0033 (3.88)**	0.0034 (3.95)**
Illiteracy rate	0.0087 (4.38)**	0.0046 (2.24)*	0.008 (4.11)**	0.0047 (2.27)*
Provincial govt size		-2.158 (-4.47)**		-1.961 (-3.71)**
Number of observations	182	182	182	182
Number of groups	26	26	26	26
R ² within	0.506	0.580	0.532	0.583

Note: The numbers in parentheses are t-statistics, corrected for panel heteroskedasticity.

The symbol * indicates significance at the 5% level.

The symbol ** indicates significance at the 1% level.

Table 2 summarizes the main results. First, we examine the effect of *VB* on health

¹³ As indicated in Table 2, two fiscal decentralization indicators, the economic level (per capita GDP) and the dependent variable, are defined in logs. As explained in the text, the coefficients of the variables can be interpreted as elasticity by a log transformation. A log transformation is sometimes applied in order to manage heteroskedasticity. Many other studies apply a log transformation (Filmer and Pritchett, 1999; de Mello, 2000; Baldacci, Guin-Siu and de Mello, 2003; Jin and Zou, 2005). Filmer and Pritchett (1999) discussed in detail the transformation of variables to logs.

outcomes (*IMR*). Vertical balance captures the importance of intergovernmental fiscal transfers, including various kinds of subsidies, to counties, which fill the fiscal gaps of the counties. Model (a) is the simplest model including *VB* as a variable of interest. Model (c) includes the intersection term between *VB* and *RCE*; however, coefficients of *VB* and the intersection term are not statistically significant in model (c). The coefficient is negative and statistically significant in model (a); that is, the elasticity of *VB* to *IMR* is negative. When *VB* increases, *IMR* decreases. The same result is confirmed in model (b), where *RCE* is controlled. This result suggests that intergovernmental transfers to county governments are important for attaining better health outcomes, after controlling for the influence of the relative importance of the county government.

Second, we focus on the effect of *RCE* on *IMR*. Is an increase in the relative importance of the county government good for health outcomes? All coefficients of *RCE* are statistically significant. The coefficient of the intersection term is statistically significant in model (f), but less significant in model (g). The coefficients of *RCE* are negative in models (d) and (e), which means that enhancing the relative importance of county governments leads to a lower *IMR*. We must consider the intersection term effect in models (f) and (g). The elasticity of *RCE* is $\beta_1 + \beta_2 * \ln(VB)$, which varies depending on the variable *VB*. The elasticity of *RCE* varies from -0.37 to 0.07 in model (f) and from -0.24 to -0.08 in model (g). These results suggest important points. When we do not consider the interaction effect between *RCE* and *VB*, the empirical result suggests a simple interpretation of the impact of county importance on health outcomes (*IMR*). That is, when the relative importance of county responsibility is enhanced, *IMR* decreases. However, when we consider the interaction effect, the interpretation is not so straightforward. The impact of increasing the relative importance of the county government on *IMR* becomes more positive as *VB* decreases, which occurs when county expenditure is financed more by the county's own revenues.

Regarding the control variables, the effects on infant mortality rate are as expected. Economic development leads to better health outcomes (a lower infant mortality rate). A higher fertility rate or a higher illiteracy rate (a lower education level) brings about worse health outcomes (a higher infant mortality rate). A higher rural ratio in a province will result in worse health outcomes.

We examine the effect of fiscal decentralization below the province level on health

outcomes. What is the impact of intergovernmental fiscal transfers to county governments on health outcomes? Does increasing the relative responsibility of the county government improve health outcomes? Our empirical work suggests that, first, if the relative importance of the county (the *ratio* of county expenditure to total provincial expenditure) is constant, more fiscal transfers are important to attain better health outcomes. In general, county governments tend to face fiscal difficulties in carrying out their responsibilities. Thus, it is important to transfer fiscal resources to counties. In other words, this result implies that if fiscal decentralization is not accompanied by the provision of adequate resources to lower tiers of government, it will prevent the achievement of expected outcomes.¹⁴

Second, increasing the relative importance of the county government will bring about better health outcomes as the county government's expenditure will be financed more by its own revenue. This suggests that when a county government has more of its own fiscal resources, an increase in its responsibility will improve health outcomes. This is suggestive to consider the effect of fiscal decentralization on health outcomes. In theory, increasing the responsibility of the county government relative to the provincial government is expected to bring about better health outcomes. However, broadening the relative responsibility of the county government does not automatically lead to better outcomes. The county's own fiscal capacity is an important factor.

In summary, our results imply that transferring adequate fiscal resources to county governments to carry out their assigned responsibilities is important, and strengthening the county government's own fiscal capacity to realize the expected benefits of increasing its relative responsibility is also important.

5. Conclusion

This study empirically examined the impacts of fiscal decentralization on health outcomes in the case of China. The empirical results showed the importance of adequate intergovernmental transfers to achieve better health outcomes. In addition, strengthening the county's own fiscal capacity is important for realizing the expected

¹⁴ This empirical finding supports previous studies that cast doubt on the benefits of decentralization (Jütting et al., 2005).

outcomes.

The findings support *potential* gains from fiscal decentralization in the form of improved health outcomes. By the same token, they suggest important requirements for the potential benefits to be realized. First, lower tiers of government responsibilities must be accompanied by adequate resources. Second, the balance between the responsibility and the fiscal capacity of a lower tier government is important in realizing the expected benefits of fiscal decentralization.

Our analysis empirically examined the impact of fiscal decentralization on health. However, the results are suggestive rather than conclusive. We should mention the limitations of our empirical study. We use infant mortality rate as the health outcome variable, but we need to examine other health outcomes based on data availability, to find the comprehensive effects of fiscal decentralization on health. Limits exist on fiscal data, such as health expenditures, because we use fiscal data at the county level. Examining other types of fiscal decentralization indicators depending on data availability is possible. These issues would be the subject of future studies.

The empirical analysis suggests that improving intergovernmental fiscal arrangements and strengthening the fiscal capacity of lower tiers of government is necessary to attain better health outcomes in decentralized developing countries. In addition, the institutional capacity or governance of the lower tiers of government is critical, particularly in developing countries, where weak institutional capacity or governance frequently hinders the provision of appropriate health services.

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Appendix

Table 1A Indicator and Description

Indicator	Description
<i>Fiscal Decentralization</i>	
Ratio of county govt expenditure (RCE)	Ratio of county government fiscal expenditure to provincial total fiscal expenditure
Vertical balance (VB)	Ratio of county government fiscal expenditure to its own fiscal revenue
<i>Control variables</i>	
Economic level	Provincial per capita GDP
Rural/urban ratio	Ratio of rural population to urban population in province
Birth rate (fertility rate)	Ratio of number of births to the average population in province (times 1000 (%))
Illiteracy rate (Education level)	Ratio of number of illiterate population to total population, aged 15 and over (%)
Provincial govt size	Provincial total fiscal expenditure relative to provincial GDP