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Introduction

Fiscal decentralization, the devolution of fiscal power and authority from the central to local governments, has been a fundamental aspect of China's transition to a market economy, and it is quickly becoming one of the most researched areas in Chinese economics. While most economists agree that fiscal decentralization has been beneficial to China's economic growth as a transition economy, there has been growing concern about the possible detrimental effects of decentralization on other aspects of the Chinese economy (i.e. regional economic disparities, macroeconomic stability, and health care).

Despite numerous publications on fiscal decentralization and several publications on health care in China, the existing literature fails to sufficiently address the effects of decentralization on health care. For example, a study by the World Bank (1997) discussed the "profound repercussions" of fiscal decentralization on Chinese health care, yet it offered little empirical evidence to support this claim. In my independent work, I empirically examine the effects of fiscal decentralization on health care in China by estimating a model that regresses health care variables against decentralization variables.

From my analysis, I conclude that decentralization has not been detrimental to health care when health care performance is measured by the number of doctors per 10,000 people, mortality rates, and local health care expenditure. However, the effects of decentralization on health care are inconclusive when health care performance is measured by the number of hospital beds per 10,000 people.

This paper is divided into five sections. The first section discusses theories of federalism. The second section presents an overview of China's economic reforms since 1980. The third section discusses the current state of health care in China and its

supposed relationship to fiscal decentralization. The fourth section discusses the data, the variables, and the model I use to measure the effects of decentralization on health care. The fifth section discusses the results of my empirical analysis.

I. First and Second Generation Theories of Federalism

Within the realm of federalism, two schools of thought explaining the economic benefits of decentralization have emerged. First-generation theories, discussed in several works spanning the mid-1940s to the early 1970s, emphasize two main benefits of decentralization. The first benefit, discussed by Hayek (1945), asserts that local governments are able to make better decisions than the national government about local conditions and preferences because they have better access to local information. The second benefit, discussed by Tiebout (1956), maintains that competition among local governments "...allows citizens to sort themselves and match their preferences with a particular menu of local public goods."[1] Building on these preceding works, Musgrave (1959) and Oates (1972) propose that the appropriate assignment of expenditures and taxes to the various levels of government could increase welfare on both the local and national levels.[2]

Second-generation theories focus on government incentives and state-market relationships (Qian and Roland, 1998 and Qian and Weingast, 1997). Specifically, these theories contend that governments have hidden agendas and are not benevolent, as the first-generation theories assume. Thus, second-generation theories find that a strong relationship between local expenditures and local revenue can align the interests of local

[1] Jin, Hehui, Yingyi Qian, and Barry R. Weingast, "Regional Decentralization and Fiscal Incentives: Federalism, Chinese Style," Stanford University (1999) 6.

governments to local economic prosperity.[3] Furthermore, second-generation theories expand beyond the scope of first-generation theories by examining the effects of federalism on government behavior.

One of the key differences between first- and second-generation theories is their diametric perspectives on revenue transfers between the central and local governments. Although first-generation theories emphasize the benefits of fiscal decentralization, they also recognize a number of circumstances where decentralization leads to allocative distortions and a weakening of the central government's fiscal capability. Due to these concerns, first-generation theories do not find complete regional "self-financing" (i.e., the dependence of local governments on their own tax revenue collection for the financing of their expenditures) desirable.[4]

In contrast, second-generation theories find that the benefits of regional "self-financing" outweigh the disadvantages of allocative distortions and a weakening of the central government's fiscal capacity. Linking the revenue collections of local governments with their expenditures and limiting the central government's redistribution among local governments will provide a greater incentive to local governments to pursue market-oriented reforms. These market-oriented reforms will increase the economic productivity of the locale, and the increase in local productivity will increase the revenue base of local governments. Thus, placing fiscal responsibility into the hands of local governments proves to be economically beneficial, especially in a transition economy.

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[2] Qian, Yingyi, and Barry R. Weingast, "Federalism as a Commitment to Preserving Market Incentives," Journal of Economic Perspectives 11.4 (Fall 1997) 83.
[3] Jin, Hehui, Yingyi Qian, and Barry R. Weingast, "Regional Decentralization and Fiscal Incentives: Federalism, Chinese Style," Stanford University (1999) 8.
[4] Ibid, 9.

II. An Overview of Chinese Fiscal Decentralization

The Chinese fiscal administrative system consists of a central government and four subnational levels of government, which are referred to as "local governments." The local governments consist of:

- 31 provincial-level localities: 22 provinces, four municipalities under the central government, and five autonomous regions.
- Prefecture level: 335 prefectures and municipalities.
- County level: 2166 counties and cities.
- Township level: Several tens of thousands of townships, towns, and city districts.

Prior to 1980, China's fiscal system was heavily centralized. Profits and taxes from local governments were sent to the central government and then transferred back to provinces according to their expenditure needs. Local governments did not have an active role in the economy.

Since 1980, China has undergone a series of reforms that have given local governments more fiscal authority and incentives to develop local economies. Local governments have more power in revenue collection, government expenditure, credit allocation, investment project proposal, price and wage control, foreign trade management, and industrial policy formation.[5] Since reforms began in 1980, the intergovernmental relationship has gone through three main phases. These phases are discussed below.

In 1980, the centralized system became a revenue sharing system. The system, called the contract responsibility system, divided revenues into three types: central-fixed

revenues (revenues accrued to the center), local-fixed revenues (revenues accrued to the localities), and shared revenues (revenues allocated between the center and localities according to an agreed set of rules). From 1980-1984, approximately 80 percent of shared revenues were sent to the central government, and 20 percent were retained by the local governments.[6] The local governments collected the majority of revenues. The central government determined the bases and rates of all taxes.

Due to growing regional economic disparities, the central government revised the contract responsibility system in 1985. The revised version of the revenue sharing system set varying tax schedules that were based on the budget balances of local governments in the previous years. The new system enabled financially weaker regions to retain more revenues or more subsidies and allowed the central government to maintain control over the richer regions (i.e., Shanghai, Beijing, Tianjin, Liaoning, Jiangsu, and Zhejiang) that contributed most to central revenue. Although the reformed system effectively dealt with growing regional economic disparities, it reduced the richer regions' incentive to expand their tax bases. Thus, revenues collected by the richer regions grew more slowly than the national average from 1985-1988.

In 1988, the central government adopted a new system that utilized six types of central-provincial revenue-sharing methods. Each method applied to a specific number of provinces. The 1988 fiscal contract system further increased the revenue share retained by the localities, especially those that made significant contributions to the central government's revenue. This system lasted until late 1993.

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[5] Ma, Jun, Intergovernmental Relations and Economic Management in China (Great Britain: The Ipswich Book Company Ltd, 1997) 1.
[6] Ibid, 32.

In 1994, the central government introduced a tax-assignment system. Instead of allowing local governments to collect almost all the taxes, the central government set up its own tax collection agency, the National Tax Service, to collect both the central-fixed and shared taxes. Local tax services would collect local-fixed taxes. The reform addressed fiscal decline and macroeconomic instability worries by giving the central government control over a larger proportion of the total revenue.

III. Health Care in China

China has more than 200,000 health establishments and approximately 5.3 million health professionals, including 1.9 million doctors (about 1.6 doctors per 1,000 people). There are more than three million hospital beds, which is about 2.4 beds per 1,000 people.[7] In comparison, the United States has 2.4 doctors per 1,000 people and about 3.85 beds per 1,000 people.[8] China's overall health status, as measured by life expectancy, and infant, child, and maternal mortality rates is excellent compared with other countries at similar income levels. Health in China has improved immensely in the past 40 years. Since 1960, the life expectancy rate at birth has increased from 55 to 69 years.[9] In the United States, the life expectancy at birth since 1960 has increased from 69.7 to 75.2 years.[10]

China's gains in health care over the past four decades are declining according to the World Bank (1997). The World Bank argues that decentralization has detrimentally affected Chinese health care in rural areas. Prior to the economic reforms that began in

[7] World Bank, Financing Health Care: Issues and Options for China, (Washington DC: World Bank, 1997) 17.
[8] American Medical Association, Trends in U.S. Health Care 1992, (Chicago: American Medical Association) 41-42.
[9] World Bank, Tackling Health Transition in China, (Washington, DC: World Bank, 1999) 2.

1980, most rural areas had a cooperative medical system that reached most of the rural Chinese population. Under this system, village authorities used funds from agricultural workers to hire health practitioners who took care of the villagers' basic health needs.[11] Economic reforms since 1980 have eliminated agricultural collectives, consequently weakening the financial base of the cooperative medical system. By 1985, fewer than 10 percent of China's villages maintained cooperative arrangements. In 1993, about 7 percent of China's rural population were insured, down from 48 percent in 1981.[12]

The World Bank also contends that fiscal decentralization hurt the viability of health care in China's poorest regions. In the pre-reform period, the pursuit of communist egalitarianism required that residents in all regions enjoy as equal a living standard as possible. To achieve equitable living standards across regions, the Chinese government transferred a large share of income from richer and prospering regions to subsidize residents in more backward and more slowly growing regions. [13] Owing to government intervention in the form of regional income redistribution, residents in backward regions enjoyed a relatively high standard of living compared with the output level in those regions. Due to decentralization, the central government has been less able to correct income inequalities between regions. Since local governments control most of the spending on public health, the increase in regional income disparity has hampered health care in the poorest regions. These areas, plagued with the worst public health

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[10] American Medical Association, Trends in U.S. Health Care 1992, (Chicago: American Medical Association) 5.
[11] World Bank, Financing Health Care: Issues and Options for China, (Washington DC: World Bank, 1997) 24.
[12] World Bank, Financing Health Care: Issues and Options for China, (Washington DC: World Bank, 1997) 15.
[13] Tian, Xiaowen. "Market Orientation and Regional Economic Disparities in China," Post-Communist Economies, 11.2, (1999) 167.

problems, now have the least capacity to develop and maintain public health programs. The health institutions in these areas must rely on user fees to generate revenues.

IV. Empirical Analysis

Previous Work Relevant to My Research

Jin, Qian, and Weingast (1999) measured the effects of decentralization on economic growth.[14] Specifically, they estimated a model that regressed economic growth variables (i.e. GDP growth, growth of non-agricultural employment, growth of non-state industrial output, etc.) against variables that measured the degree of decentralization (i.e. fiscal decentralization, state industry decentralization, and bureaucratic distance). They found that decentralization had a positive and significant effect on provincial economic growth.

The model I use to estimate the effects of decentralization on health care is a slight modification of the model used by Jin, Qian, and Weingast (1999). The model I estimate uses the same decentralization variables that were used by Jin, et al. However, the model regresses health care variables, not economic growth variables, against the decentralization variables. The following paragraphs describe the data, the variables, and the model I use.

Data

For my empirical work, I use a panel data set of 29 provinces from 1980 to 1993.[15] Unless otherwise noted, the data for the decentralization variables was obtained from Jin, Qian, and Weingast (1999). The data for the health care variables was obtained

[14] Jin, Hehui, Yingyi Qian, and Barry R. Weingast: 16-18.
[15] The data excludes Hainan and Guangdong since the data of Hainan was incorporated into Guangdong before 1988 and became separately listed after it obtained provincial status in 1988.

from *China Regional Economy: A Profile of 17 Years of Reform and Opening-Up*, which was published by the State Statistical Bureau.

Variables for Decentralization

Fiscal decentralization, the first variable, is the ratio of local government spending per capita to central government spending per capita. The higher the ratio, the greater the degree of fiscal decentralization. This is the standard measurement for fiscal decentralization commonly used in the literature.

Price subsidies were netted out from revenue and expenditure before 1986 but were included as revenue and expenditure after 1986, so they are excluded from the government expenditure data after 1986. Since there is no explicit provincial data on price subsidy expenditures, the following method is used to estimate them. The central and local share of price subsidies nationwide is used to calculate the total local expenditures of the price subsidies for each year. Since price subsidies are only for urban residents, and they are provided uniformly across provinces, the provincial share of urban residency in the country is used to allocate price subsidies to each province.[16]

Although a ratio between local government spending per capita and central government spending per capita is the standard measurement for fiscal decentralization, it is somewhat difficult to interpret the fiscal decentralization coefficient in a regression. Therefore, I transform the fiscal decentralization variable into a variable where local government expenditure per capita is divided by total government expenditure per capita (local government expenditure per capita plus central government expenditure per capita).

[16] Ibid, 17.

This second decentralization variable is called percent fiscal decentralization. The higher the percentage, the greater the degree of fiscal decentralization.

The data supplied by Jin, Qian, and Weingast (1999) was missing fiscal decentralization values for the year 1993 in many provinces, and it was also missing a large number of fiscal decentralization values for the Hainan province. I attempted to reconstruct their data set to include these missing values and used data from *China Regional Economy: A Profile of 17 Years of Reform and Opening-Up*. Although I was unable to exactly replicate their data, the correlation between the reconstructed data set and their data set is approximately 0.98. In addition to the fiscal decentralization and percent fiscal decentralization variables that are based on the Jin, Qian, and Weingast (1999) data, my analysis includes the variables reconstructed fiscal decentralization and reconstructed percent fiscal decentralization, which are based on the reconstructed data set.

Accounting for the characteristics of top provincial officials, the fifth variable used to measure decentralization is a transformed version of an index constructed by Huang (1996) that measures the bureaucratic distance between top provincial officials and the central government. The index is based on the career background of the provincial Party Secretaries. The score is 4 if the Party Secretary was promoted from within the same province; 3 if the Party Secretary was moved to the current post from another province; 2 if the Party Secretary served in the central government before his current appointment; and 1 if the Party Secretary concurrently holds a post in the central government. From the index, the higher the score, the farther the top provincial officials are from the central government. It is assumed that those provincial officials who have

higher scores in the index are more likely to have better local information and better local connections. They should also be more committed to local prosperity.

The sixth variable used to measure decentralization is state industry decentralization, which reflects the relative importance of the local government versus the central government in supervising the state owned enterprises within a province. This variable is measured by the portion of industrial output from the state owned enterprises supervised by local governments in the total industrial output from all state owned enterprises in a province.

Variables for Health Care Performance

I use four variables to assess China's health care sector. The first variable is the number of doctors per 10,000 people in each province. I assume that an increase in doctors per 10,000 people indicates an improvement in health care.

The second variable is the number of hospital beds per 10,000 people in each province. I assume that an increase in hospital beds per 10,000 people indicates an improvement in health care. However, duplication problems within the Chinese health care system make the variable a questionable indicator of health care performance. It is argued that an increase in hospital beds does not necessarily reflect actual gains in health care. Yet, I believe including the variable in my analysis will be helpful in my assessment of the health care sector.

The third variable is the provincial mortality rate. The mortality rate measures the percentage of a province's population that has died within a given year. I assume that a decrease in the mortality rate indicates an improvement in health care. However, the use of mortality rates in my analysis could lead to a specification problem because

decentralization does not directly affect mortality rates. Rather, decentralization affects the quality of medical inputs, and a change in the quality of medical inputs affects mortality rates. I take this specification problem into account when analyzing my results.

The fourth variable is local health care expenditure. Due to data limitations, the data I use for local health care expenditure is given in conjunction with local expenditure on education, science, and culture. The values my model estimates for local health care expenditure are interpreted with the above fact in mind. I assume that an increase in local health care expenditure indicates an improvement in health care.

The Model

I estimate the model:

$$\mathbf{Y_{it} = \alpha_i + \beta_t + \delta X_{it} + u_{it}}$$

In this equation, Y_{it}, is a vector of variables that measures health care performance. The α_i represent the constant for each province. The β_t denotes the annual dummies, which are meant to capture the effects of nationwide macroeconomic fluctuation. X_{it} is a vector of variables measuring the degree of decentralization. The u_{it}'s are the disturbance terms. In my analysis, I estimate the decentralization variables individually and jointly.

Random-Effects versus Fixed-Effects

Jin, Qian, and Weingast (1999) estimated their model using a fixed-effects approach. However, the use of a fixed-effects approach in the estimation of my model may not be appropriate due to the use of different dependent variables. The fixed-effects model indicates that there are significant provincial specific effects that, if not accounted for, could bias the estimates of the model. A fixed-effects model accounts for provincial specific effects, implying that any correlation between the health care variables and the

decentralization variables cannot be attributed to inherent provincial characteristics.[17] If there are no significant provincial specific effects that could bias the estimates of the model, then a random-effects model is appropriate.

I estimate my model with a random-effects model and a fixed-effects model. I then conduct a Hausman specification test to judge whether a random-effects or a fixed-effects model would be more appropriate to estimate the model with. The estimates of the decentralization variables are based on either a fixed-effects or random-effects model, depending on which model is indicated as appropriate.

V. Results

Doctors per 10,000 People

The random-effects model is appropriate in both the individual and joint models where doctors per 10,000 people is regressed against the decentralization variables. The random-effects model specification suggests that the number of doctors per 10,000 people in a poor region is not significantly different from the number of doctors per 10,000 people in a richer region.

In the model where doctors per 10,000 people is regressed against fiscal decentralization, the coefficient for fiscal decentralization is 0.9967, and it is significant at the five percent level with a t-statistic of 2.908. In the model where doctors per 10,000 people is regressed against reconstructed fiscal decentralization, the coefficient for fiscal decentralization is not significant at the five percent level. By including 1993 data and the data for the Hainan province, the significant positive effects of fiscal decentralization on the number of doctors per 10,000 people apparently disappears.

[17] Ibid, 24.

In the model where doctors per 10,000 people is regressed against percent fiscal decentralization, the coefficient for percent fiscal decentralization is negative, but it is not significant at the five percent level. In the model where doctors per 10,000 people is regressed against reconstructed percent fiscal decentralization, the coefficient for reconstructed percent fiscal decentralization is also negative, but it is not significant at the five percent level.

In the model where doctors per 10,000 people is regressed against bureaucratic distance, the coefficient for bureaucratic distance is not significant at the five percent level. The coefficient for state industry decentralization is also not significant at the five percent level in the model where doctors per 10,000 people is regressed against state industry decentralization.

In the models where doctors per 10,000 people is regressed against fiscal decentralization (or reconstructed fiscal decentralization), state industry decentralization, and bureaucratic distance, the decentralization variables are not significant at the five percent level. In the model where doctors per 10,000 people is regressed against percent fiscal decentralization (or reconstructed percent fiscal decentralization), state industry decentralization, and bureaucratic distance, the decentralization variables are not significant at the five percent level.

Disregarding the fiscal decentralization coefficient (which was estimated with incomplete data), the results suggest that fiscal decentralization has not been detrimental to health care as measured by the number of doctors per 10,000 people.

Hospital Beds per 10,000 People

The fixed-effects model is appropriate in the model where hospital beds per 10,000 people is regressed against the fiscal decentralization variable. The coefficient for fiscal decentralization is positive with a coefficient of 2.966, and it is statistically significant at the five percent level with a t-statistic of 7.231. In the model where hospital beds per 10,000 people is regressed against the reconstructed fiscal decentralization variable, the fixed-effects model is appropriate. The coefficient for the reconstructed fiscal decentralization variable is 4.493, and it is significant at the five percent level with a t-statistic of 5.500.

The fixed-effects model is appropriate in the model where hospital beds per 10,000 people is regressed against percent fiscal decentralization. The percent fiscal decentralization coefficient is negative and significant at the five percent level with a t-statistic of -2.605. For every one point increase in percent fiscal decentralization, the number of hospital beds per 10,000 people decreases by 11.139. In the model where hospital beds per 10,000 people is regressed against reconstructed percent fiscal decentralization, the reconstructed fiscal decentralization coefficient is also negative, but it is not significant at the five percent level.

In the model where hospital beds per 10,000 people is regressed against bureaucratic distance, the fixed-effects model is appropriate. The positive coefficient for bureaucratic distance is not statistically significant at the five percent level. The random-effects model is appropriate in the model where hospital beds per 10,000 people is regressed against state industry decentralization. The coefficient for state industry decentralization is not significant at the five percent level.

The fixed-effects model is appropriate in the model where hospital beds per 10,000 people is regressed against fiscal decentralization (or reconstructed fiscal decentralization), bureaucratic distance, and state industry decentralization. The coefficient for fiscal decentralization is 2.378, and it is significant at the five percent level with a t-statistic of 5.076. The coefficient for reconstructed fiscal decentralization is 3.951, and it is significant at the five percent level with a t-statistic of 3.986. In both models, the coefficients for bureaucratic distance and state industry decentralization are not significant at the five percent level.

The fixed-effects model is appropriate in the model where hospital beds per 10,000 people is regressed against percent fiscal decentralization (or reconstructed percent fiscal decentralization), bureaucratic distance, and state industry decentralization. The coefficient for percent fiscal decentralization is negative and significant at the five percent level with t-statistic of -2.270. For every one point increase in percent fiscal decentralization, the number of hospital beds per 10,000 people decreases by 10.254. The reconstructed percent fiscal decentralization coefficient is not significant at the five percent level. In both models, bureaucratic integration and state industry decentralization are not significant at the five percent level.

The highly insignificant estimates of bureaucratic integration and state industry decentralization suggest that these decentralization variables are not good variables to use in estimating the effects of decentralization on the number of hospital beds per 10,000 people. This implies that the primary factor determining the number of hospital beds in a region is economical and not political.

The effects of fiscal decentralization on the number of hospital beds per 10,000 people are inconclusive. When measured as a ratio, fiscal decentralization is found to have a positive and significant effect on the number of hospital beds per 10,000 people. However, when measured as a percentage, fiscal decentralization is found to have a negative effect on the number of hospital beds per 10,000 people. These results give little insight into the effects of decentralization on health care when health care performance is measured by this variable.

Mortality Rates

The random-effects model is appropriate in both the individual and joint models where the mortality rate is regressed against the decentralization variables. In the model where the mortality rate is regressed against fiscal decentralization, the coefficient for fiscal decentralization is -0.2002, and it is significant at the five percent level with a t-statistic of -2.105. The reconstructed fiscal decentralization variable coefficient is -0.407, and it is also significant at the five percent level with a t-statistic of -2.381.

In the model where the mortality rate is regressed against percent fiscal decentralization, the coefficient for percent fiscal decentralization is negative and significant at the five percent level with a t-statistic of –2.936. For every one point increase in percent fiscal decentralization, the mortality rate decreases by 2.344 percentage points. In the model where the mortality rate is regressed against reconstructed percent fiscal decentralization, the coefficient for percent fiscal decentralization is negative and significant at the five percent level with a t-statistic of -2.598. For every one point increase in percent fiscal decentralization, the mortality rate decreases by 1.809 percentage points.

In the model where the mortality rate is regressed against bureaucratic distance, the coefficient for bureaucratic distance is not significant at the five percent level. In the model where the mortality rate is regressed against state industry decentralization, the coefficient for state industry decentralization is not significant at the five percent level.

In the model where the mortality rate is regressed against fiscal decentralization (or reconstructed fiscal decentralization), bureaucratic distance, and state industry decentralization, the coefficients for fiscal decentralization (or reconstructed fiscal decentralization) are negative and significant. The coefficient for fiscal decentralization is -0.2299 and has a t-statistic of -2.243. The coefficient for the reconstructed fiscal decentralization is -0.6292 and has a t-statistic of -3.305. Bureaucratic distance and state industry decentralization are not statistically significant.

In the models where the mortality rate is regressed against percent fiscal decentralization (or reconstructed percent fiscal decentralization), bureaucratic distance, and state industry decentralization, the coefficients for percent fiscal decentralization (or reconstructed percent fiscal decentralization) are negative and significant. The coefficient for percent fiscal decentralization is -3.610 and has a t-statistic of -4.260. The coefficient for reconstructed percent fiscal decentralization is -3.429 and has a t-statistic of -4.376. Bureaucratic distance and state industry decentralization are not statistically significant.

The negative and significant relationship between fiscal decentralization, measured as a ratio and as a percentage, and the mortality rate suggests that decentralization has not been detrimental to the mortality rate. Health care has improved, and this improvement has been realized in lower provincial mortality rates. Furthermore, the specification of a random-effects model implies that the mortality rates in the

provinces are not specific provincial characteristics – the mortality rates in poorer regions are not inherently different from the mortality rates in the richer provinces. If health care were worse in the poorer provinces, and this situation caused higher mortality rates, a fixed-effects model would be needed to estimate the models because the mortality rates in the poorer regions would be biased upward while the mortality rates in the richer regions would be biased downward.

Local Health Care Expenditure

The data on local health care expenditure is taken from the category "Local Expenditure on Science, Education, Culture, and Health Care." *China Regional Economy: A Profile of 17 Years of Reform and Opening-Up* did not specify how the money was allocated among the four groups. Although it is possible that local health care expenditures have decreased over time while expenditures in the other three groups have increased substantially, the possibility of such a scenario is unlikely. In my analysis, I assume that local health care expenditure has a constant percent share of the category's expenditure.

The random-effects model is appropriate in the model where local expenditure on science, education, culture, and health care expenditure is regressed against fiscal decentralization. The coefficient for fiscal decentralization is not significant at the five percent level. The fixed-effects model is appropriate in the model where local expenditure on science, education, culture, and health care is regressed against the reconstructed fiscal decentralization variable. The coefficient is 11.685, and it is significant at the five percent level with a t-statistic of 6.409.

The fixed-effects model is appropriate in the model where local expenditure on science, education, culture, and health care expenditure is regressed against percent fiscal decentralization (or reconstructed percent fiscal decentralization). The coefficient for percent fiscal decentralization variable is 81.78, and it is significant at the five percent level with a t-statistic of 13.607. The coefficient for reconstructed percent fiscal decentralization is 71.416, and it is significant at the five percent level with a t-statistic of 9.724.

The fixed-effects model is appropriate in the model where local expenditure on science, education, culture and health care is regressed against bureaucratic distance. The coefficient for bureaucratic distance is 0.644, and it is significant at the five percent level with a t-statistic of 2.082.

The random-effects model is appropriate in the model where local expenditure on science, education, culture, and health care is regressed against state industry decentralization. The coefficient for state industry decentralization is not significant at the five percent level.

The fixed-effects model is appropriate in the model where local expenditure on science, education, culture, and health care is regressed against fiscal decentralization (or reconstructed fiscal decentralization), state industry decentralization, and bureaucratic distance. The coefficient for fiscal decentralization is 3.941 and it is significant at the five percent level with a t-statistic of 4.485. The reconstructed fiscal decentralization coefficient is 11.536, and it is significant at the five percent level with a t-statistic of 6.559. State industry decentralization and bureaucratic distance are not statistically

significant. However, bureaucratic distance is positive and significant at the ten percent level.

These results suggest that fiscal decentralization, measured as a ratio and as a percentage, and bureaucratic distance have been beneficial to local expenditure on health care. Political and economic factors have a significant role in determining local expenditure on science, education, culture, and health care.

Although local health care expenditure is shown to have a positive and significant correlation with decentralization, the increase in local health care expenditure may not necessarily reflect an improvement in local health care. Local health care expenditures could have increased marginally compared to the substantial decrease in central government allocations for health care expenditures. Since the more destitute provinces relied heavily on the central government as a source of funding, a decrease in central government funds could have worsened their health care. Yet, the worsened state of health care would fail to be reflected by the marginal increases in local health care expenditure. However, such an unfortunate state of health care in the poorer provinces seems unlikely given the results of the doctors per 10,000 people regressions and the mortality rate regressions.

Conclusion

In my junior independent work, I attempt to determine whether or not fiscal decentralization has been detrimental to health care in China by estimating a model in which health care performance variables are regressed against decentralization variables.

I conclude that fiscal decentralization has been beneficial to health care when health care performance is measured by mortality rates and local expenditure on health

care. Fiscal decentralization, reconstructed fiscal decentralization, percent fiscal decentralization, and reconstructed percent fiscal decentralization are shown to have a negative and significant relationship with mortality rates. Fiscal decentralization, reconstructed fiscal decentralization, percent fiscal decentralization, reconstructed percent fiscal decentralization, and bureaucratic distance have a positive and significant effect on local health care expenditure.

When health care performance is measured by doctors per 10,000 people, the results suggest that decentralization has not detrimentally affected health care. The coefficient for fiscal decentralization suggests that fiscal decentralization has been beneficial to doctors per 10,000 people. However, the fiscal decentralization data was missing several values from 1993 and the Hainan province, so the reconstructed fiscal decentralization coefficient and the reconstructed percent fiscal decentralization coefficients are probably more reliable coefficients. These coefficients imply that decentralization has not significantly affected the number of doctors per 10,000 people.

The effects of decentralization on the number of hospital beds per 10,000 people are inconclusive. The fiscal decentralization and reconstructed fiscal decentralization coefficients indicate that fiscal decentralization, when measured as a ratio, has been beneficial to hospital beds per 10,000 people. Yet, the percent fiscal decentralization and the reconstructed percent fiscal decentralization coefficients suggest that fiscal decentralization has been detrimental to the number of hospital beds per 10,000 people.

Bureaucratic distance and state industry decentralization are not very good decentralization variables to use in measuring the effects of decentralization on health care. The results of the analysis suggest that health care performance is more closely

related to the financial, rather than the political, aspects of decentralization. The relationship between local government expenditure and central government expenditure is the primary force that affects health care performance, and the more political aspects of decentralization, measured by bureaucratic distance and state industry decentralization, are not as relevant.

Although my findings are not completely conclusive, they strongly suggest that fiscal decentralization has not been detrimental to health care in China. Fiscal decentralization has been beneficial to the health care sector in terms of decreasing the mortality rates and increasing local government expenditure on health care, and it has not been detrimental to the number of doctors per 10,000 people in a province. My research hopefully adds a new and more empirical perspective to the existing literature concerning fiscal decentralization and health care.

Table 1. Summary Statistics of Variables

	Mean	Minimum	Maximum	Standard Deviation
Decentralization				
Fiscal Decentralization	1.475	0.397	4.785	0.932
Reconstructed Fiscal Decentralization	0.797	0.263	2.549	0.479
Percent Fiscal Decentralization	0.549	0.284	0.827	0.132
Reconstructed Percent Fiscal Decentralization	0.412	0.208	0.718	0.125
Bureaucratic Distance	1.777	1	4	0.849
State Industry Decentralization	0.751	0.095	0.997	0.126
Health Care				
Doctors per 10,000 People	22.022	7.4	134.8	21.461
Hospital Beds per 10,000 People	25.190	13.3	59.3	9.091
Mortality Rate (%)	6.234	3.8	9.88	0.960
Local Health Care Expenditure (100 million yuan)	13.487	0.76	95.38	11.025

The data spans 1980-1993. Unless otherwise noted, the data was obtained from *China Regional Economy: A Profile of 17 Years of Reform and Opening-Up*

Fiscal Decentralization is the ratio of local government expenditure per capita to central government expenditure per capita. The data for this variable was obtained from Jin, Qian, and Weingast (1999).

Percent Fiscal Decentralization is a transformation of the fiscal decentralization variable. The variable is local government expenditure per capita divided by the total government expenditure per capita (local government expenditure per capita plus central government expenditure per capita). The data for this variable was obtained from Jin, Qian, and Weingast (1999).

The fiscal decentralization data obtained from Jin, Qian, and Weingast (1999) was missing many values from 1993 and from the Hainan province. I reconstructed their fiscal decentralization data and included these missing values. Although the exact numbers differ, the correlation between the two fiscal decentralization data sets is 0.98. The reconstructed variables are based on the reconstructed data set, and they are calculated in the same way as the fiscal decentralization and percent fiscal decentralization variables.

Bureaucratic Distance is an index that accounts for the characteristics of top provincial officials. The score is 4 if the Party Secretary was promoted with the same province; 3 if the Party Secretary was moved to the current post from another province; 2 if the Party Secretary served in the central government before his current appointment; and 1 if the Party Secretary concurrently holds a post in the central government. The data was obtained from Huang (1996).

State Industry Decentralization is measured by the portion of industrial output from the state owned enterprises supervised by local government in the total industrial output from all state owned enterprises in a province.

Local Health Care Expenditure is Local Expenditure on Science, Education, Culture, and Health Care.

Table 2. The Effects of Fiscal Decentralization on Health Care Performance

	Fiscal Decentralization	Reconstructed Fiscal Decentralization
Doctors per 10,000 People	0.997	0.881
	(2.908)	(1.260)
Hospital Beds per 10,000 People	2.966	4.493
	(7.231)	(5.500)
Mortality Rates	-0.2002	-0.4065
	(-2.105)	(-2.381)
Local Health Care Expenditure	0.6291	11.685
	(0.947)	(6.409)

** t-statistics are in parentheses

Each regression was done with both a fixed-effects and random-effects model. The Hausman specification test was used to determine which model better suited the data. The better-suited model estimates appear in the columns.

Each regression includes a full set of provincial dummies and year dummies.

The Fiscal Decentralization column lists the fiscal decentralization coefficients when each health care variable is regressed against the fiscal decentralization variable.

The Reconstructed Fiscal Decentralization column lists the reconstructed fiscal decentralization coefficients when each health care variable is regressed against the reconstructed fiscal decentralization variable.

Table 3. The Effects of Percent Fiscal Decentralization on Health Care Performance

	Percent Fiscal Decentralization	Reconstructed Percent Fiscal Decentralization
Doctors per 10,000 People	-5.445	-3.997
	(-1.644)	(-1.336)
Hospital Beds per 10,000 People	-11.139	-6.702
	(-2.605)	(-1.815)
Mortality Rates	-2.345	-1.809
	(-2.936)	(-2.598)
Local Health Care Expenditure	81.781	71.416
	(13.607)	(9.724)

** t-statistics in parentheses

Each regression was done with both a fixed-effects and random-effects model. The Hausman specification test was used to determine which model better suited the data. The better-suited model estimates appear in the columns.

Each regression includes a full set of provincial dummies and year dummies.

The Percent Fiscal Decentralization column lists the percent fiscal decentralization coefficients when each health care variable is regressed against the percent fiscal decentralization variable.

The Reconstructed Percent Fiscal Decentralization column lists the reconstructed fiscal decentralization coefficients when each health care variable is regressed against the reconstructed percent fiscal decentralization variable.

Table 4. The Effects of Bureaucratic Distance or State Industry Decentralization on Health Care Performance

	Bureaucratic Distance	State Industry Decentralization
Doctors per 10,000 People	0.0490	0.3643
	(0.364)	(0.207)
Hospital Beds per 10,000 People	0.2731	0.0871
	(1.552)	(0.043)
Mortality Rates	0.0427	0.3977
	(0.938)	(0.819)
Local Health Care Expenditure	0.6438	-2.3800
	(2.082)	(-0.526)

** t-statistics in parentheses

Each regression was done with both a fixed-effects and random-effects model. The Hausman specification test was used to determine which model better suited the data. The better-suited model estimates appear in the columns.

Each regression includes a full set of provincial dummies and year dummies.

The Bureaucratic Distance column lists the bureaucratic distance coefficients when each health care variable is regressed against the bureaucratic distance variable.

The State Industry Decentralization column lists the state industry decentralization coefficients when each health care variable is regressed against the state industry decentralization variable.

Table 5. The Effects of Fiscal Decentralization, Bureaucratic Distance, and State Industry Decentralization on Health Care Performance

	Fiscal Decentralization	Bureaucratic Distance	State Industry Decentralization
Doctors per 10,000 People	0.5545	-0.0615	0.4122
	(1.390)	(-0.407)	(0.255)
Hospital Beds per 10,000 People	2.3780	0.0363	1.3290
	(5.076)	(0.203)	(0.697)
Mortality Rates	-0.2299	0.0579	0.4175
	(-2.243)	(1.160)	(0.842)
Local Health Care Expenditure	3.9409	0.5641	-0.9318
	(4.485)	(1.697)	(-0.263)

** t-statistics in parentheses

Each regression was done with both a fixed-effects and random-effects model. The Hausman specification test was used to determine which model better suited the data. The better-suited model estimates appear in the columns.

Each regression includes a full set of provincial dummies and year dummies.

The Fiscal Decentralization column gives the coefficients for fiscal decentralization when each health care variable is regressed against the fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

The Bureaucratic Distance column gives the coefficients for bureaucratic distance when each health care variable is regressed against the fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

The State Industry Decentralization column gives the coefficients for state industry decentralization when each health care variable is regressed against the fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

Table 6. The Effects of Reconstructed Fiscal Decentralization, Bureaucratic Distance, and State Industry Decentralization on Health Care Performance

	Reconstructed Fiscal Decentralization	Bureaucratic Distance	State Industry Decentralization
Doctors per 10,000 People	1.1833	-0.0696	0.2967
	(1.432)	(-0.460)	(0.182)
Hospital Beds per 10,000 People	3.9508	0.0061	0.5346
	(3.986)	(0.034)	(0.272)
Mortality Rates	-0.6292	0.0556	0.2479
	(-3.305)	(1.118)	(0.507)
Local Health Care Expenditure	11.5359	0.5048	-0.8023
	(6.559)	(1.572)	(-0.231)

** t-statistics in parentheses

Each regression was done with both a fixed-effects and random-effects model. The Hausman specification test was used to determine which model better suited the data. The better-suited model estimates appear in the columns.

Each regression includes a full set of provincial dummies and year dummies.

The Reconstructed Fiscal Decentralization column gives the coefficients for reconstructed fiscal decentralization when each health care variable is regressed against the reconstructed fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

The Bureaucratic Distance column gives the coefficients for bureaucratic distance when each health care variable is regressed against the reconstructed fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

The State Industry Decentralization column gives the coefficients for state industry decentralization when each health care variable is regressed against the reconstructed fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

Table 7. The Effects of Percent Fiscal Decentralization, Bureaucratic Distance, and State Industry Decentralization on Health Care Performance

	Percent Fiscal Decentralization	Bureaucratic Distance	State Industry Decentralization
Doctors per 10,000 People	-2.8703	-0.0576	0.0099
	(-0.783)	(-0.380)	(0.006)
Hospital Beds per 10,000 People	-10.2543	0.0372	-0.1520
	(-2.270)	(0.200)	(-0.077)
Mortality Rates	-3.6097	0.06299	0.3706
	(-4.260)	(1.290)	(0.764)
Local Health Care Expenditure	85.7838	0.4882	1.3933
	(13.116)	(1.813)	(0.485)

** t-statistics in parentheses

Each regression was done with both a fixed-effects and random-effects model. The Hausman specification test was used to determine which model better suited the data. The better-suited model estimates appear in the columns.

Each regression includes a full set of provincial dummies and year dummies.

The Percent Fiscal Decentralization column gives the coefficients for percent fiscal decentralization when each health care variable is regressed against the percent fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

The Bureaucratic Distance column gives the coefficients for bureaucratic distance when each health care variable is regressed against the percent fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

The State Industry Decentralization column gives the coefficients for state industry decentralization when each health care variable is regressed against the percent fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

Table 8. The Effects of Reconstructed Percent Fiscal Decentralization, Bureaucratic Distance, and State Industry Decentralization on Health Care Performance

	Reconstructed Percent Fiscal Decentralization	Bureaucratic Distance	State Industry Decentralization
Doctors per 10,000 People	1.2924	-0.0668	0.1441
	(0.342)	(-0.440)	(0.088)
Hospital Beds per 10,000 People	-1.8171	0.0179	-0.0518
	(-0.387)	(0.096)	(-0.026)
Mortality Rates	-3.4294	0.0585	0.2325
	(-4.376)	(1.192)	(0.483)
Local Health Care Expenditure	85.3697	0.04010	-0.2010
	(12.368)	(1.451)	(-0.067)

** t-statistics in parentheses

Each regression was done with both a fixed-effects and random-effects model. The Hausman specification test was used to determine which model better suited the data. The better-suited model estimates appear in the columns.

Each regression includes a full set of provincial dummies and year dummies.

The Reconstructed Percent Fiscal Decentralization column gives the coefficients for reconstructed percent fiscal decentralization when each health care variable is regressed against the percent fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

The Bureaucratic Distance column gives the coefficients for bureaucratic distance when each health care variable is regressed against the reconstructed percent fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

The State Industry Decentralization column gives the coefficients for state industry

decentralization when each health care variable is regressed against the reconstructed percent

fiscal decentralization, bureaucratic distance, and state industry decentralization variables.

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