Measuring the Fiscal Health of Municipal Governments in Zhejiang Province

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Introduction

China has been rapidly urbanizing. In 1963, only 18 percent of China's population lived in urban areas; 50 years later, in 2013, the urban share had reached 54 percent. By 2025, China's Ministry of Housing and Urban-Rural Development estimates that 70 percent of the country's population will live in cities. This pattern of rapid urbanization has major fiscal implications. As the physical size and population of cities has grown, local governments in China have faced the dual challenges of building vast amounts of new capital infrastructure (for water, electricity, sewage, and transportation), and providing their growing populations with a range of public services, such as public safety, education, sanitation, public health, and transportation.

Having well-functioning urban local governments that are capable of providing their residents with a full-array of public services not only enhances the well-being of urban residents, but is an essential pre-condition for the continued economic growth and prosperity of urban China. Urban areas are the engines of China's economic growth. Urbanization and the accompanying higher density spurs innovation and enhances economic productivity. In fact, in 2013, the 75 Chinese cities with the largest GDPs accounted for about 68 percent of China's total GDP.

In the past few years, there has been a rising concern that some Chinese cities have inadequate resources to finance their growing needs. Municipal governments have relied heavily on the sale of land leases and the imposition of development fees as a primary means of financing the construction of infrastructure needed to service new development (Bahl, Goh, and Qiao, 2014). With slowing rates of economic development, and in some cases, slower rates of population growth, new sources of revenue, either from local sources or from increased intergovernmental transfer will be needed if the fiscal health of China's cities is to be maintained or improved.

In China, as in nearly all countries, there exists substantial spatial variation in both the public service needs of local governments and in their abilities to raise revenues to pay for those services. These differences across local governments lead to what public finance economists refer to as *fiscal disparities*. If local governments tax their residents and businesses at similar rates, fiscal disparities exist when, for reasons outside the control of local governments, the levels of public service provision vary. Alternatively, fiscal disparities exist if local governments must tax their residents and businesses at very different rates in order to provide similar levels of public services.

To the best of our knowledge, there have been no systematic empirical studies of the fiscal condition of local governments in China, and no attempt to quantify the extent of fiscal disparities that exist among local governments both within provinces and across provinces. For China's cities to prosper, it is important to know whether individual municipal governments have the *capacity* to provide its residents and businesses with adequate levels of public services without burdening these residents and businesses with unreasonable high levels of taxation. Deriving an effective measure of the fiscal resources available to municipal governments to provide public services will provide both the national government and provincial governments with the information necessary to target intergovernmental transfers, i.e. grants, to those municipal governments in most need of assistance.

In this paper, we calculate the difference between the amount of money individual municipal governments need to deliver a specified mix of public services and the amount of money each government can be expected to raise from local sources at a standard rate of revenue effort. We refer to the first term as *expenditure needs* and the second term as *revenue-raising capacity.* After accounting for the receipt of intergovernmental transfers, the difference, which is generally referred to as a *fiscal gap*, provides a measure of the fiscal health of individual municipal governments. Fiscal gaps have been calculated in a number of countries and used as a basis of distributing grants from national governments to provincial governments (Shah, 1966; Reschovsky, 2007), and from provincial governments to local governments (Bradbury, et al., 1984). In this paper, we draw upon the existing literature to estimate the fiscal condition of all municipal governments in Zhejiang province. Our results will allow us to quantify the fiscal disparities that exist within Zhejiang, and to simulate alternative systems of intergovernmental transfers designed to enhance the ability of municipal governments to provide their residents with adequate local public services and to reduce existing fiscal disparities within the province.

In China, fiscal arrangements between provincial governments and local governments vary substantially across provinces. The assignment of expenditure functions to local governments, intergovernmental transfer systems, and the assignment of revenue sources and the definition of tax bases all vary by province. For that reason, measuring the relative fiscal health of local governments makes most sense if conducted separately for different provinces. In order to develop a methodology for measuring fiscal health in China, we chose to focus on municipal governments within Zhejiang province.

There were several reasons for selecting Zhejiang. First, we were able to assemble extensive fiscal, economic, and demographic data for all 67 of Zhejiang's county-level municipal governments. Second, Zhejiang is characterized by large regional economic disparities. The southwestern part of the province is generally poor and has relatively few natural resources, while the northern part is adjacent to Shanghai and the Yangtze River Delta, the largest and most prosperous mega-region in China. Finally, the Province-Governing-County (GPC) fiscal system is used in Zhejiang. Under the GPC system, county-level governments interact directly with the provincial government, and are responsible for the majority of public services within their boundaries. This system contrasts with the fiscal systems in place in most other provinces, where county governments are subordinate to larger prefecture-level governments, with the latter responsible for most fiscal and administrative decisions.

The Measurement of Expenditure Needs

Expenditure need is defined as the minimum amount of spending each municipality needs to provide a common quantity of public services of average quality. Within a province, the expenditure needs of municipal governments vary because some municipal governments may have broader public service responsibilities than other municipalities, and because variations in the characteristics of different municipalities lead to variations in the *costs* of providing a standard level of public services. Factors that indicate differences in costs are defined as characteristics of a municipality that cannot be easily manipulated or controlled by local government officials. These cost factors reflect the environment in which local governments operate. They generally

include the demographic and social composition of a municipality, physical characteristics of a community, and, for public services that are subject to substantial economies of scale, municipal population.

We define the per resident expenditure needs of municipal government i (EN_i) as

(1) $$EN_i = \sum_j^N SR_{ij}*S_j*CI_{ij}.$$

We have divided total municipal spending in Zhejiang province into eight functional categories, each represented by the subscript j. Our spending categories are listed in Table 1. SR_{ij} is an indicator of public service responsibility. For five of the spending categories, SR_{ij} always has a value of one, indicating that all 67 municipal governments in Zhejiang provide those public services. For education spending, SR_{ij} is set equal to the relative student to population ratio in each municipality, for transportation spending, SR_{ij} is set equal to the kilometers of roads per capita in each municipality relative to the provincial average, and for spending on social security, SR_{ij} is set equal to the share of each municipality's resident population with local hukou registration.

S_j is a measure of a "standard" level of per capita public service j within Zhejiang, defined for the purposes of this analysis as equal to the provincial average level of per capita spending on public service j. CI_{ij} is the value in local government i of a cost index for public service j. The values of the cost index indicate the minimum amount of money needed to provide public service j in municipality i relative to the cost of delivering public services in a municipality with average values of the statistically-identified cost factors.

The major methodological challenge in determining the cost of municipal government public service provision is to disentangle data on actual spending into one portion that represents the costs of the service, another portion related to decisions of local governments on the quantity and quality of public services to provide, and a third portion reflecting the inefficiencies involved in public service provision.

Because the data that would allow us to estimate true cost functions are not available, in this paper we estimate *reduced form expenditure equations* as a means of identifying cost factors and determining the expenditure needs of municipal governments.[1] As with a cost function, the dependent variable in an expenditure equation is generally per-resident expenditures on a particular local government service or group of services. A potential problem with using expenditure functions to measure the costs of local government services is that it may be somewhat difficult to isolate variables that affect costs from variables that indicate differences in service-provision preferences of local governments. Public sector inefficiencies are reflected in regression residuals.

The estimated coefficients from an expenditure function can be used to construct a *cost index*. The basic idea is to calculate for each municipality the level of "hypothetical" per capita spending based on the actual values of the cost factors and the provincial-average values of a set

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[1] See Bradbury, et al. (1984), Ladd, Reschovsky, and Yinger (1992), Green and Reschovsky (1994), and Chernick and Reschovsky (2015) for examples of empirical studies of municipal fiscal health that were based on cost indices generated from the estimation of expenditure functions.

of "control" variables that reflect factors, such as GDP per capita, that are unrelated to costs, but influence the level of municipal spending.

As indicated above, we divided total municipal spending into eight functional categories. As part of our initial analysis, we have estimated expenditure functions for each of these categories of spending. The dependent variable for *education* is education spending per pupil. The dependent variable for *transportation* is transportation spending per kilometer of roads within each municipality. The dependent variable for *social security and employment* is social security spending per residents with local hukous. The dependent variables for the other five spending categorizes are defined as spending per resident population.

After exploring a number of specifications, we have identified several cost factors associated with each category of spending. These cost factors are listed in Table 1. All eight of the expenditure functions also included three control variables: Municipal GDP per capita, intergovernmental transfers per capita, and per capita non-budgetary funds. In our paper, we will discuss our estimation strategy and present the results of the expenditure regressions.

In our conference paper, we will discuss in detail, our data set (primarily for the year 2013), the regressions that we estimated, and the calculation of cost indices for each municipality. Taking into account differences across municipalities in service responsibilities, and average per capita spending levels for each expenditure function, we used equation (1) to calculate the expenditure needs of each municipal government in Zhejiang province.

Our initial analysis indicates a substantial amount of variation in the per capita expenditure needs of municipal governments in Zhejiang. The coefficient of variation equals 0.31. In Figure 1, we have divided per capita expenditure needs into four categories. The darkest colors display those municipal governments with the highest levels of per capita expenditure needs. The figure shows that the municipalities with the highest expenditure needs are concentrated in South-western Zhejiang. It also shows that places with the lowest expenditure needs are in the southeastern and northern parts of the province.

Table 1

Cost Factors for Spending Categories
Municipal Governments, Zhejiang Province, 2013

Spending categories	Cost factors
General administration	Population; population squared
	Indicator variable: prefecture-level city
	Government employees and former employees per capita
Education	Number of students; students squared
Agriculture, forestry and water conservancy expenditure	Percentage of GDP from agriculture
	Per capita output of aquatic products
	Population
	Percent of population living in urbanized areas
Social security and employment	Percentage of population eligible for retirement payments
	Unemployment rate
	Government employees and former employees per capita
Transportation	Freight traffic (in tons) per kilometer
	Percentage of roads that are highways; percentage of roads that are highways squared
	Population density of urbanized area
Public health	Percentage of population above 60 who are healthy
	Government employees and former employees per capita
Public order and security	Population; population squared
	Population density of urbanized areas
	Percent of population living in urbanized areas
Urban and rural community affairs	Population density of urbanized area
	Indicator variable: prefecture-level city

Figure 1

**Expenditure Needs of County-Level Municipalities, Zhejiang Province
(2013 Yuan per capita)**
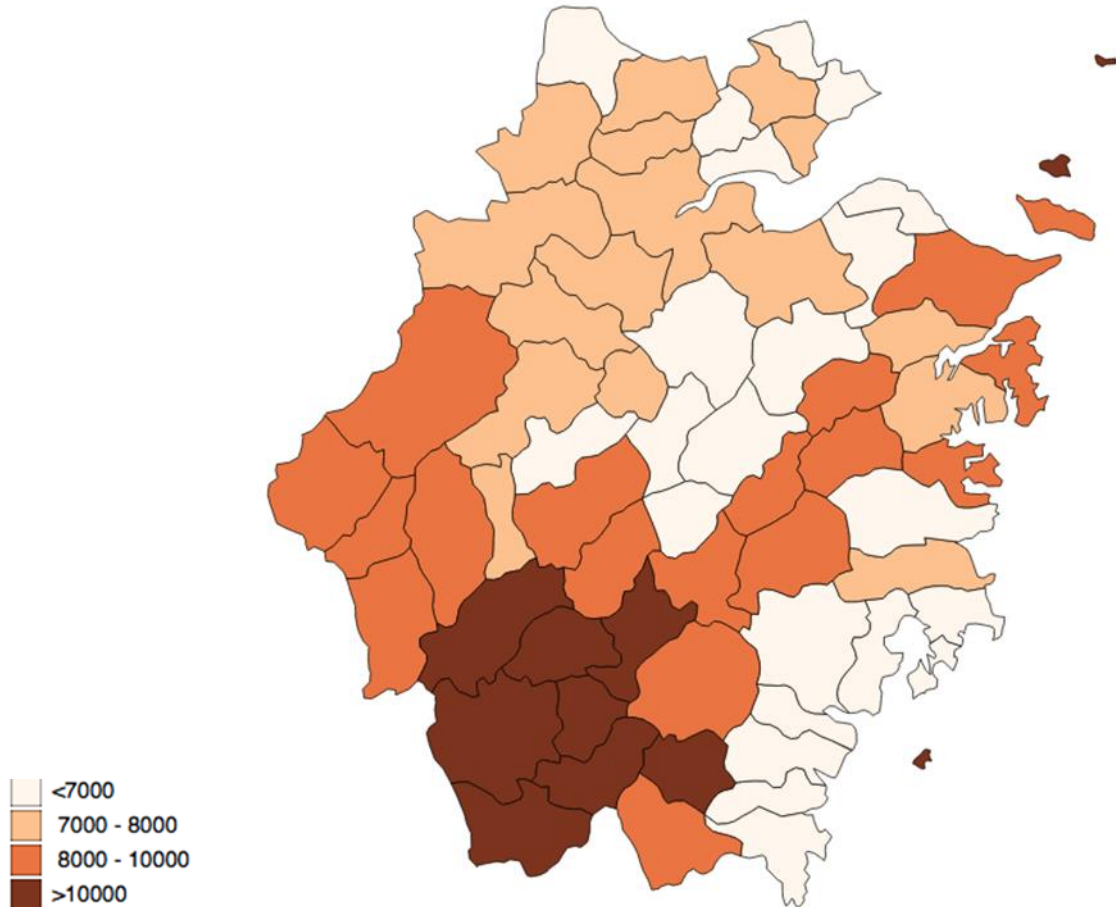
The Measurement of Revenue-Raising Capacity

The revenue-raising capacity of a local government can be defined as the amount of revenue the government could raise from its own resources if it taxes those resources at a standardized rate, in practice often the average rate utilized by all local governments in the same province. In cases where provincial governments collect accurate data on the size of local tax bases, a *representative tax system* (RTS) approach can be used for the calculation of revenue-raising capacity. Using this approach, the tax bases of all taxes or other local revenue sources in use within a province are each multiplied by a standardized tax rate. The sum of these calculation provides an estimate of revenue-raising capacity.[2]

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[2] See Chernick (1998) for a detailed discussion of the RTS and other methods of calculating revenue-raising capacity.

Because of the lack of comprehensive data on tax bases, the RTS approach cannot be used in Zhejiang. In our analysis, we relate a municipal government's revenue-raising capacity to the size of the municipality's economy, which we measure by the municipality's Gross Domestic Product (GDP). This method of calculating revenue-raising capacity is known as the *total taxable resources* approach. It explicitly ignores actual tax instrument, i.e. a value-added tax, and assumes that the long-run capacity of local governments to raise revenue is proportional to the size of its economy. To implement this approach, we multiplied each municipality's per capita GDP by a standardized rate of revenue effort. We computed the standardized rate by dividing the total own-source revenue of all county-level municipal governments in Zhejiang province by the Zhejiang's GDP.

Our initial results indicate a wide variation in per capita revenue-raising capacity across Zhejiang. Per capita revenue-raising capacity ranges from 1,988 RMB in Taishun (泰顺县) to 9,723 RMB in Ningbo (宁波市). The coefficient of variation of per capita revenue-raising capacities is 0.32. Figure 2 illustrates the spatial variation of revenue-raising capacity across Zhejiang province. The highest capacity areas are located in the north, while the lowest-capacity municipalities are mostly located in the south of the province.

The Calculation of Fiscal Gaps

In order to assess the fiscal health (as of 2013) of the county-level municipal governments in Zhejiang province, we must account for each government's receipt of intergovernmental transfers. These include shared tax revenues, unconditional transfers, and categorical grants. Our measure of fiscal health is the gap between each municipal government's expenditure needs and the sum of their revenue-raising capacity and their current receipt of intergovernmental transfers.

The goal of our paper is to develop a measure of the **relative** fiscal health of municipal governments in Zhejiang. We want to distinguish between those municipalities that are in the strongest fiscal condition and those that are in the weakest fiscal condition relative to the average or typical municipality in Zhejiang province. Note that both our measures of expenditure need and of revenue-raising capacity are calculated on the basis of arbitrary "standards", i.e. average per capita spending in the case of expenditure needs, and average revenue effort in the case of revenue-raising capacity. The absolute value of fiscal gaps is a function of how these "standards" are defined. We have chosen *average* standards for convenience, not necessarily as a guide for policy. In order to emphasize the relative nature of our fiscal gap measures, we normalize our gaps by subtracting from each municipality's gap the value of the average gap. Thus, by construction, the value of the average gap is equal to zero.

Figure 3 shows the variation of fiscal gap across Zhejiang province. The areas with worst fiscal condition are located at the south western of Zhejiang province, while the north areas are in the best fiscal health. Our initial calculations indicate that substantial fiscal disparities exist among municipal governments in Zhejiang province. The two municipalities in the strongest fiscal health have relative fiscal gaps of less than -4,000 RMB per capita (smaller numbers indicate stronger fiscal health), while the two municipalities with the weakest fiscal health have relative fiscal gaps in excess of 2,500 RMB per capita.

Figure 2

Revenue-Raising Capacity of County-Level Municipalities, Zhejiang Province (2013 Yuan per capita)
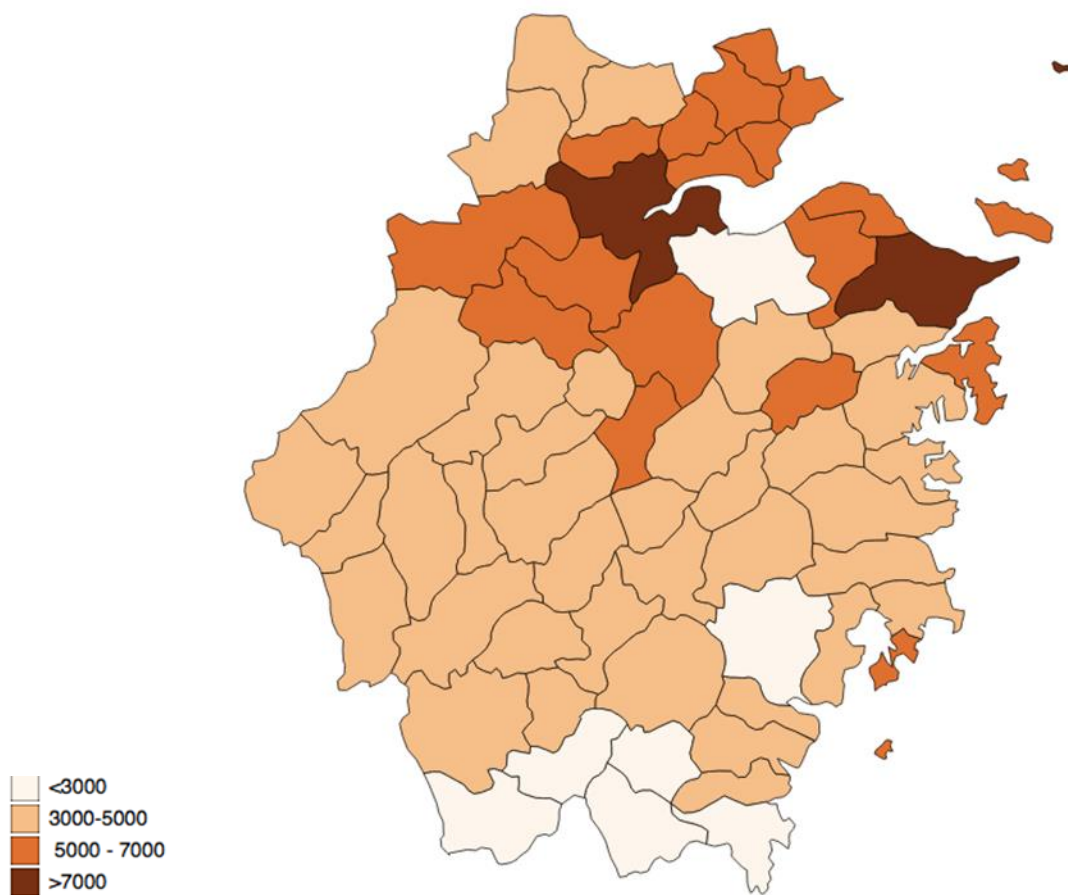
In our proposed conference paper, we will finalize our estimates of expenditure need and revenue-raising capacity. In the last section of the paper we will evaluate the role of existing fiscal transfers in reducing fiscal disparities in Zhejiang province. We will also perform several simulations of possible reforms of the existing system of intergovernmental transfer system. The reforms will be designed to reduce the fiscal disparities that exist among municipal governments in Zhejiang province and to target larger amounts of per capita fiscal transfers to the municipal governments in the weakest fiscal health.

Figure 3

**Relative Per Capita Fiscal Gaps of County-Level Municipalities, Zhejiang Province
(2013 Yuan per capita)**

<-650

-650 - 200

200 - 1100

>1100
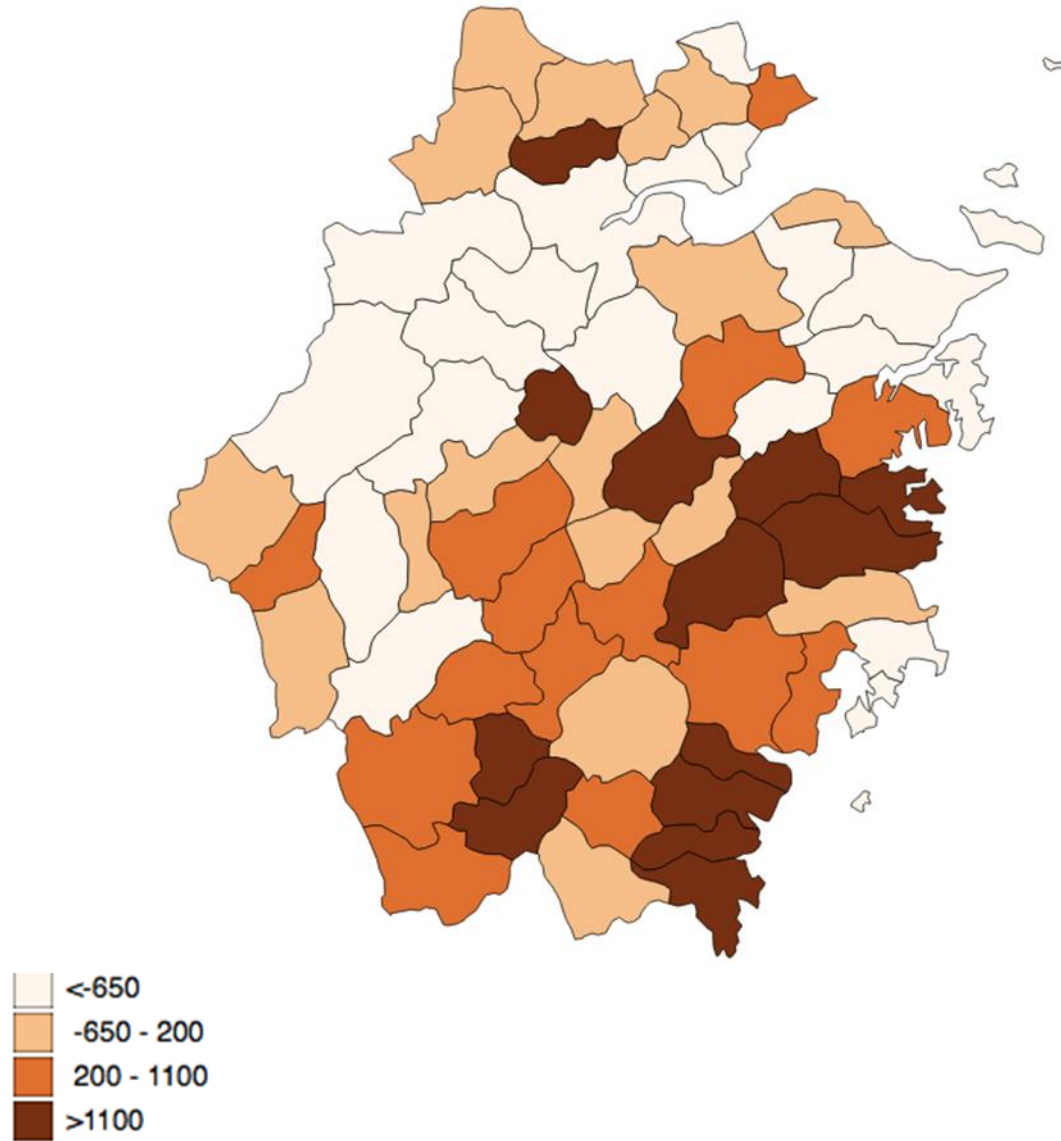
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