IMFG
Institute on Municipal Finance & Governance

SCHOOL OF CITIES

IMFG Papers on Municipal Finance and Governance

No. 63 • 2023

Measuring the Fiscal Health of U.S. Cities

Howard Chernick and Andrew Reschovsky

UNIVERSITY OF TORONTO

IMFG Papers on Municipal Finance and Governance

Measuring the Fiscal Health of U.S. Cities

By
Howard Chernick and Andrew Reschovsky

IMFG
Institute on Municipal Finance & Governance

SCHOOL OF CITIES

UNIVERSITY OF TORONTO

Institute on Municipal Finance and Governance
School of Cities
University of Toronto
55 St. George Street, Suite 853
Toronto, Ontario M5S 0C9
e-mail contact: info.imfg@utoronto.ca
http://imfg.org

Series editor: Philippa Campsie

ISBN 978-0-7727-7362-3
ISSN 1927-1921

About IMFG

The Institute on Municipal Finance and Governance (IMFG) is an academic research hub and non-partisan think tank based in the School of Cities at the University of Toronto.

IMFG focuses on the fiscal health and governance challenges facing large cities and city-regions. Its objective is to spark and inform public debate, and to engage the academic and policy communities around important issues of municipal finance and governance. The Institute conducts original research on issues facing cities in Canada and around the world; promotes high-level discussion among Canada's government, academic, corporate, and community leaders through conferences and roundtables; and supports graduate and post-graduate students to build Canada's cadre of municipal finance and governance experts. It is the only institute in Canada that focuses solely on municipal finance issues in large cities and city-regions. .

IMFG is funded by the City of Toronto, the Regional Municipality of York, the Regional Municipality of Halton, the Neptis Foundation, Avana Capital Corporation, and Maytree.

Authors

Howard Chernick is Professor Emeritus in the department of economics, Hunter College, and at the Graduate Center, City University of New York. He is a research affiliate of the Institute for Research on Poverty at the University of Wisconsin, and a board member of the Institute for Taxation and Economic Policy. He has been a visiting professor at the University of Rennes I, France; the School of Public and International Affairs, Princeton University; and the New School. In 2015 he received a Fulbright specialist grant at the École Normale Supérieure de Cachan, France. Selected publications include "Fiscal Effects of Block Grants for the Needy: An Interpretation of the Evidence" (1998); "On the Determinants of Sub-National Tax Progressivity in the U.S." (2005); "State and Local Fiscal Progressivity: Consequences for Economic Growth" (2010); "The Impact of the Great Recession and the Housing Crisis on the Financing of America's Largest Cities" (2011); and "The Fiscal Effects of the Covid-19 Pandemic on Cities: An Initial Assessment" (2020). He is the editor of *Resilient City: The Economic Impact of the 9/11 Attack on NYC* (Russell Sage, 2005).

Andrew Reschovsky is Professor Emeritus of public affairs and applied economics at the University of Wisconsin–Madison. His previous academic appointments were at Rutgers University and Tufts University. He publishes widely on topics related to subnational government finance, tax policy, and intergovernmental relations. Reschovsky spent a year working at the Office of Tax Analysis in the U.S. Treasury and has also served as an adviser to the Organisation of Economic Co-operation and Development in Paris and the Financial and Fiscal Commission in South Africa. In 2011, he was awarded the Steven D. Gold award by the Association of Public Policy Analysis and Management in recognition of his contributions to state and local fiscal policy. He earned a Ph.D. in economics from the University of Pennsylvania.

Acknowledgements
The authors would like to thank David Copeland for his excellent research assistance, and the Lincoln Institute of Land Policy for financial support for an earlier version of this paper.

Measuring the Fiscal Health of U.S. Cities

Howard Chernick and Andrew Reschovsky

Abstract

This paper analyzes the fiscal health of 148 U.S. central cities using a specially constructed *Fiscally Standardized Cities* (FiSC) database that accounts for the revenues and spending of all the governments that provide public services in cities – municipal governments, school districts, counties, and special districts. These data permit comparisons of city finance between cities with widely different governance structures. The fiscal health of a city is defined as the relationship between its expenditure needs and its revenue-raising capacity. The expenditure needs calculations are obtained from regressions of six separate categories of spending. The analysis makes it possible to identify variables that are likely to affect the cost of providing different types of local public services. Tax capacity is measured by applying average tax rates to the major tax bases used by each FiSC in the database. User-charge capacity is based on residents' ability to pay. Own-source fiscal capacity is supplemented by grants from the federal and state governments. The empirical analysis is based on a panel dataset for 2000 through 2014. The results indicate that that a substantial number of U.S. cities are in weak fiscal health because their revenue-raising capacity, including intergovernmental transfers, falls short of their expenditure needs. Fiscal disparities, measured as the variation in these fiscal gaps, were large in both 2000 and 2014 and increased over that period. On average, own-source revenue-raising capacity grew much faster than intergovernmental transfers. The largest single contributor to the increase in fiscal disparities was the uneven growth in own-source revenue-raising capacity across cities. Targeted increases in federal and state grants could help improve the fiscal health of U.S. central cities and reduce fiscal disparities.

Keywords: municipal finance, urban fiscal health, municipal revenue, municipal spending, fiscal capacity, expenditure need, transfers, intergovernmental relations

JEL codes: H71 H72 H75 H76 H77

Measuring the Fiscal Health of U.S. Cities

1. Introduction

As Richard Bird (2015) has argued, how one chooses to measure the fiscal health of cities depends on the questions one wants to answer. Concerns about default risk, inadequate infrastructure investments, or poor public service provision all call for different measures of fiscal health. Some cities may be at high risk of bankruptcy even though they continue to provide their residents with an adequate level of public services at reasonable rates of taxation. Other cities may be at low risk of bankruptcy or default, but nevertheless fail, by almost any standard, to provide their residents with good-quality public services.

Examples abound: limited access to potable water in Flint, Michigan; abysmally low high-school graduation rates in Cleveland, San Bernardino, Philadelphia, and Atlanta; violent crime rates twice to three times the national average in Chicago, Los Angeles, Houston, and Tampa (Federal Bureau of Investigation 2016; National Center for Education Statistics 2017). Detroit is a rare example of a case in which the failure to deliver core services coincided with financial insolvency and ultimately, bankruptcy.

In general, we need different metrics to distinguish cities that are at risk of financial default on their long-term debt from cities that are unable to provide their citizens and businesses with reasonable levels of public services at competitive rates of local taxation.

In this paper, our goal is to develop a way to compare the fiscal ability of the nation's major central cities to provide their residents with public services at reasonable rates of taxation. Our general conceptual approach to the measurement of city fiscal health is to calculate each city's *fiscal gap*, defined as the difference between each city's *expenditure needs* and its *revenue-raising capacity*. Cities with the largest gaps are in the weakest fiscal health. Expenditure needs are defined as the minimum amount of money a local government requires to deliver a specified set of public services.

Expenditure needs differ across cities because the *costs* of public service provision vary according to certain characteristics of each jurisdiction that are beyond the control of local public officials. Examples include the demographic and social composition of each jurisdiction, and physical characteristics such as location, land area, and weather patterns. The revenue-raising capacity of cities depends on local governments' access to various tax instruments and the size of their respective tax bases.

This approach to the measurement of fiscal health is well known, not only in the academic literature, but also as the foundation for the intergovernmental grant formulas used to allocate transfers to local governments.[1] Fiscal gaps, measured in different ways, provide the basis for formulas that countries throughout the world use to allocate intergovernmental grants (Reschovsky 2007). In the United States, many

1. A small theoretical literature addresses the various roles of horizontal equalization programs in dealing with fiscal imbalances attributable to the variation among local governments in their ability to raise revenues to finance the public services for which they are responsible (Boadway and Flatters 1982; Buchanan 1950, 1952; Flatters, Henderson, and Mieszkowski 1974).

state governments use fiscal gap formulas to allocate state education funds to their local school districts. While most of these formulas account for expenditure needs in an ad hoc manner, several studies of educational finance have involved the estimation of the expenditure needs and revenue-raising capacity of public-school districts (Duncombe and Yinger 1997, 2000; Imazeki and Reschovsky 2006).

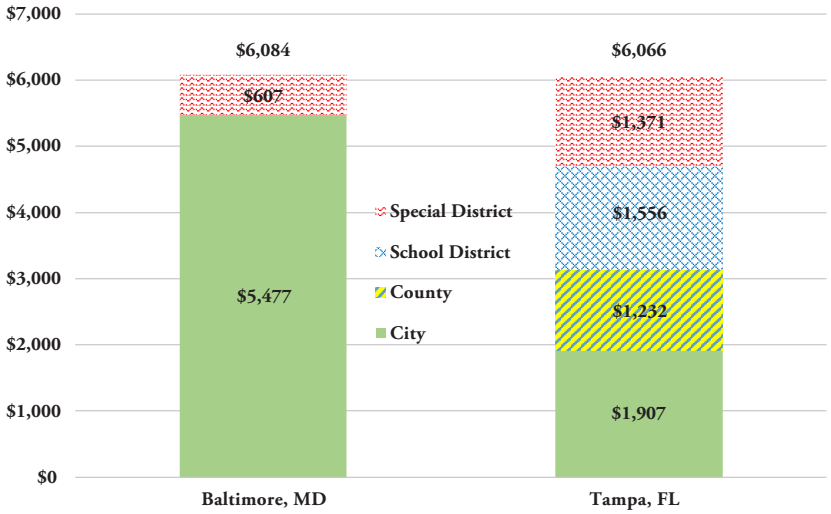
The literature contains only a few empirical studies that have calculated fiscal gaps for general-purpose local governments. Ladd and Yinger (1989) estimated the fiscal condition of 70 large American central city governments using data for 1982. The rest of the literature focuses on local governments in a single state. In an important example of analysis directly translated into policy, the fiscal gap estimates reported in Bradbury et al. (1984) provided the foundation for the allocation of "Additional Assistance" grants distributed by Massachusetts to its cities and towns for several years during the 1980s. The following studies have also made useful contributions:

- Ladd, Reschovsky, and Yinger (1991) measured the fiscal conditions of local governments in Minnesota as part of an evaluation of Local Government Assistance grants in Minnesota.
- Green and Reschovsky (1994) assessed the fiscal health of municipal governments in Wisconsin in order to evaluate Wisconsin's Shared Revenue grants to local governments.
- In an analysis of state aid in Massachusetts, Bradbury and Zhao (2009) developed a fiscal gap–based measure of the fiscal health of local governments in Massachusetts.
- Turley, Flannery, and McNena (2015) assessed the Irish system of general-purpose grants to its local governments by estimating fiscal gaps for Irish local governments.
- Yan and Reschovsky (2021) estimated fiscal gaps for the municipal governments in Zhejiang Province, China.
- Slack, Tassonyi, and Grad (2015) calculated fiscal gaps for the 30 largest municipalities in Ontario, Canada.
- Gordon, Auxier, and Iselin (2016) constructed fiscal gap measures for states as part of an effort to assess the distribution of federal grants among the states.

A major reason for the dearth of studies on the fiscal health of central cities in the United States is the great diversity of governmental structures across cities, which has made it difficult to make valid cross-city comparisons of both city revenues and expenditures. The only centralized source of annual data on the expenditures and revenues of local governments across the United States is the Census Bureau. These data are provided separately for different types of governments – municipalities, independent school districts, county governments, and special districts.

In some cities, municipal governments are responsible for providing a full array of public services, including public education, while in other cities, the municipal government shares the responsibility for providing services with other governments. These different government structures are illustrated in Figure 1, which compares per-capita spending in Baltimore and Tampa using data from fiscal year 2014.

Figure 1:
Per-Capita General Expenditures in Baltimore and Tampa FiSCs by Type of Government, FY 2014



Per-capita municipal government spending is nearly three times higher in Baltimore compared with Tampa. However, the municipal government in Baltimore is responsible for public education and a range of services often provided by county governments, while Tampa has an independent school district that provides public education and a county government that serves the Tampa region. When this difference is taken into account, total per-capita spending for public services within the boundaries of the two central cities is nearly identical. The method described below also shows significant differences in the revenue sources that support this spending, with Tampa much more dependent than Baltimore on federal grants and local charges relative to taxes and state aid.

To allow valid fiscal comparisons across central cities, the authors, along with Adam Langley at the Lincoln Institute of Land Policy, developed the concept of Fiscally Standardized Cities (FiSC). A FiSC is not an actual governmental body. Rather, it combines fiscal data from a central-city municipal government with a prorated share of both expenditures and revenues from all overlapping governments. The result is detailed revenue and expenditure data that reflect the total revenues raised on behalf of central-city residents and businesses and the public spending carried out on their behalf. For a detailed description of the methodology used to develop FiSCs, see Chernick, Langley, and Reschovsky (2015).

The Fiscally Standardized City dataset contains detailed fiscal data for 150 large central cities.[2] The starting point for choosing cities was to include all cities with 2010 populations of 200,000 or more, plus cities that had populations of at least 150,000 in 1980, even if their populations in 2010 were below 200,000. To ensure that our dataset included cities from each state, where necessary, we added cities so that our final database included the largest two cities in each state.[3] More details on the selection of the cities is provided in Langley (2020). In this paper, we use data for the 15-year period from 2000 to 2014.

This study of the fiscal condition of central cities has several advantages over previous work. The only previous study of a national sample of central cities was conducted by Ladd and Yinger (1989). They focused explicitly on municipal governments and dealt with the issue of overlapping governments by adjusting their measure of revenue-raising capacity of cities for the capacity that was "used up" by county governments and independent school districts. Their approach implicitly assigns primacy in revenue-raising to the overlapping governments.

Our use of revenue and expenditure data for fiscally standardized cities allows for a more neutral accounting of the effects of overlapping governments, without privileging any particular type of government as having "first claim" to the underlying tax base. All of the empirical literature cited above generates measures of fiscal health using a cross-sectional analysis of a single year of data (or, in certain cases, the average of data from several consecutive years). In our analysis, we draw on 15 years of data, allowing us to generate robust estimates of the expenditure needs of the cities in our sample.

Section 2 provides an overview of the method we used to measure both the expenditure needs and revenue-raising capacity of central cities. A more detailed methodological discussion of the measurement of expenditure needs and revenue-raising capacity is provided in Appendixes A and B. A description of the fiscal and non-fiscal data that we use in our study can be found in Appendix C.

In Section 3, we present the empirical results of our measurement of expenditure needs of the FiSCs in our sample of central cities. Section 4 describes the calculation of the revenue-raising capacity of FiSCs. We then use the results to calculate fiscal gaps and compare the gaps for each FiSC with the average fiscal gap among all the FiSCs in our sample. In this section, we also summarize what we have learned about the fiscal health of U.S. cities. By exploiting the panel nature of our data, we are able to highlight specific central cities that experienced the largest gains and the largest reductions in fiscal health between 2000 and 2014 and discuss the reasons for these changes in fiscal health.

2. Our analysis excludes Washington, D.C., because of a lack of state grants, and Gary, Indiana, because fiscal capacity data are unavailable.

3. These selection criteria resulted in a FiSC sample of 146 cities. To reach an even 150 cities, we added the four largest state capitals that would not have otherwise been in the FiSC sample (Hartford, CT; Salem, OR; Tallahassee, FL; and Topeka, KS). The FiSC sample contains no cities in Hawaii or New Jersey because the largest cities in these states have state-administered school districts, making it impossible to allocate education revenues and expenditures to individual cities.

In Section 5, we draw on our FiSC database to investigate two policy questions. First, we explore the overall role of state and federal grants to city governments in improving the fiscal health of cities and in reducing (or exacerbating) fiscal disparities among central cities. We also focus on the FiSCs in the nation's four most populous states to highlight the role of state intergovernmental aid policy in influencing the fiscal health of their central cities. Second, we investigate the extent to which allowing cities access to additional tax instruments influences their relative fiscal health. A concluding section summarizes the main results, and briefly considers the policy implications of our findings.

2. The Measurement of Fiscal Health

An underlying principle in the measurement of both expenditure needs and revenue-raising capacity is that to the extent possible, both measures should be independent of actual revenue and spending decisions taken by local government officials. Expenditure needs are defined as the minimum amount of spending each city needs to provide a common level of public services. *Actual* spending may be greater or less than expenditure needs.

The expenditure needs of local governments differ in part because of differences in the public services for which these governments are responsible. Because fiscally standardized cities (FiSCs) account for differences in services responsibilities by considering the services provided by overlapping local governments, differences in the expenditure needs of FiSCs are primarily due to variations in the *costs* of providing a standard level of public services.[4]

Factors that indicate differences in costs are defined as characteristics of a city 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, regional variation in labour costs, the location and physical characteristics of a community, and, for public services that are subject to substantial economies or diseconomies of scale, city population.

As described in Appendix A, our approach to determining the expenditure needs of each FiSC involves using the estimation of expenditure functions to identify cost factors for various types of local government expenditures. Using the estimated coefficients from our expenditure function regressions, we calculate *cost indexes* for each type of local government spending. The values of the cost index for each FiSC reflect the costs of providing a standard mix of public services in each city *relative* to the cost of delivering the same level of services in the FiSC with average costs. The expenditure needs of each FiSC are then determined by multiplying the appropriate cost index value by the per-capita cost of a standard bundle of public services.

4. FiSC data cannot account for differences across states in the split of service responsibilities between state and local governments. While this is not a major issue, differences across states in the assignment of functions do exist. For example, in cities such as New York and Boston, state agencies are responsible for local public transportation, and this share is not included in FiSC data. In other cities, transportation is provided by the city municipal government, or more commonly, by a special entity devoted to transportation. In either case, transportation spending is included in FiSC data. For more detail on this issue, see Chernick (2017).

The *revenue-raising capacity* of a local government is its capacity to raise revenue from taxes and from fees and charges. These sources of revenue are augmented by grants from its state government and from the federal government. *Tax capacity* can be defined as the amount of revenue a local government could raise from its own resources if it taxed those resources at a "standard" rate.

The foundation for any measure of revenue-raising capacity is the economic base of each local government. However, a potential tax base – whether it be the income of residents, business profits, wealth, consumption expenditures, or the value of real property – does not automatically confer revenue-raising capacity on a local jurisdiction. As Ladd and Yinger (1989) and Hoene and Pagano (2010) emphasize, the *actual* capacity to raise revenue depends on the legal authority granted to a local government to access various tax and revenue instruments. In most U.S. states, the revenue instruments available to local governments are determined by state government statute.

As shown in Appendix B, we measure the property tax capacity of each FiSC by multiplying its property tax base by the average property tax rate across all FiSCs, where the average rate takes account of the extent of claims on local economic output from other taxes that the FiSC is allowed to use. Similarly, for FiSCs that raise tax revenues from local sales or income taxes, tax capacity is the product of the tax base and the appropriate average tax rate. Total tax capacity is the sum of tax capacities of the taxes levied in each FiSC. Although there is no widely accepted way to measure the capacity to raise revenue from user charges and fees, in this paper, we measure user-charge capacity in each FiSC as its per-capita personal income multiplied by user-charge revenue as a percentage of income in the average FiSC.

In order to build a complete picture of the fiscal health of FiSCs, we must account for the fact that all FiSCs receive grants from the federal government and from their respective state governments. Though some grant programs have explicit (or implicit) matching provisions, we treat all intergovernmental transfers as though they are effectively lump-sum. We then calculate fiscal gaps by subtracting from the expenditure needs in each FiSC the sum of its revenue-raising capacity and the per-capita revenues it receives from state and federal grants. Larger fiscal gaps are associated with weaker fiscal health.

Because expenditure needs and revenue-raising capacity are calculated using policy "norms" – average per-capita spending in the case of expenditure needs and average tax rates in the case of revenue-raising capacity – the magnitude (or absence) of the gaps depends on these norms. Policymakers in individual cities may want to recalculate their fiscal gaps using what they consider to be more appropriate norms, such as the fiscal health of other cities in their state or region. The existence of large fiscal gaps will provide local officials with evidence of the need for additional fiscal assistance from their state government.

For comparisons of fiscal health across FiSCs and over time, it is important to trace changes in fiscal gaps in individual FiSCs relative to changes in other FiSCs. For this reason, we emphasize the fiscal health of each central city relative to the fiscal health in the average city. We accomplish this by defining the *relative* fiscal gap of a FiSC in any

given year as the difference between its fiscal gap and the average fiscal gap in the 148 central cities in our sample.

3. Estimating Expenditure Needs

In this section of the paper, we describe how we estimate expenditure functions and employ the results, first to construct cost indexes, and then to calculate the expenditure needs of FiSCs. As described in Appendix A, we estimate separate expenditure functions for combined current and capital spending on the major functions of the local governments operating in FiSCs. This disaggregated approach is intended to allow more accurate identification of the cost factors that influence spending levels on various government functions. We use annual data covering the period between 2000 and 2014 in the estimation of expenditure functions.

Using the estimated coefficients from these regressions, we calculate cost indexes and expenditure needs for the years 2000 and 2014. Table 1 shows the expenditure function regressions for six categories of current spending: K–12 education, public safety, health and social services, highways, environment (including natural resources and transportation), and government administration (including general government and debt service). Except for education and highways, all dependent variables are measured in real per-capita terms. The dependent variable for education is real education expenditures per school-aged child. Because of relatively high rates of absenteeism and truancy in city schools, school-aged population provides a better measure of school "workload" than official enrolment data. The dependent variable for highways is spending per lane mile.

The cost factors identified in the education equation (column 1 of Table 1) are school-aged population (measured in logs and entered as a quadratic), an index of comparable wages, the percentage of female-headed households, the percent of housing units built before 1939, the percentage of Hispanic population, and an indicator variable for independent school districts. Per-pupil property values and intergovernmental grants are included as control variables. Consistent with previous literature on the costs of education, we find a U-shaped relationship between expenditures per child and the number of children. Scale economies are present for cities with fewer than 60,000 school-aged children, with diseconomies for cities with an average total population exceeding 473,000.

The cost of living in different parts of the country helps explain spatial differences in wages. An exogenous measure of wage differences across cities is provided by a Comparable Wage Index (CWI) originally developed for the National Center for Education Statistics (NCES) by Lori Taylor. The index measures "the systematic, regional variations in the salaries of college graduates who are not educators" (Taylor and Glander 2006). Using her original methodology, Taylor has updated her index every year up to 2014.[5]

Previous research provides ample evidence that it is more expensive to educate children from economically disadvantaged families and students with limited English-language ability. In the regression of education spending per child, the percentage of

5. The results can be found at https://bush.tamu.edu/research/faculty/Taylor_CWI/.

Table 1:
Expenditure Function Regressions for Per-Capita Spending by Functional Category
148 Fiscally Standardized Cities, 2000–2014

	Education (per child)	Public Safety	Health & Social Services	Highways (per lane mile)	Environment & Transportation	Government Administration
Comparable wage index	3,403.2*** (6.04)	370.5*** (9.13)	-101.3 (0.89)			487.1*** (9.09)
School-age population	-4,129.9*** (7.25)					
School-aged population squared	-4,129.9*** (7.25)					
Percent female-headed households	746.8 (0.59)	936.3*** (10.68)				78.36 (0.66)
Percent Hispanic	-2,311.5*** (7.85)					
Percent of housing units built prior to 1939	5,282.2*** (16.40)					123.6*** (4.12)
Independent school district	-445.9*** (3.83)					
Per-pupil property value	0.00230*** (15.64)					
Per-capita property value		0.00154 (13.27)	0.00180*** (4.93)	0.2173*** (8.49)	0.00403*** (14.76)	0.00037** (2.40)
Per-capita federal and state aid, education	2.971 (26.36)					
Percent 65 and older		828.3*** (5.79)	2,695.6*** (6.76)			420.3** (2.19)
Percent aged 5 to 17						-863.0** (4.41)
Per-capita state aid, general support		0.2275*** (11.49)				0.045* (1.76)
Urbanized area population/city population		25.74*** (16.14)			55.50*** (14.27)	16.82*** (8.10)
Per-capita federal aid		0.1846*** (11.62)				
Population density				4.021*** (14.02)	0.007* (2.24)	
Per-capita state aid, health			1.634*** (15.30)			
Per-capita state aid, welfare			1.475*** (28.89)			

Table 1, continued:
Expenditure Function Regressions for Per-Capita Spending by Functional Category
148 Fiscally Standardized Cities, 2000–2014

	Education (per child)	Public Safety	Health & Social Services	Highways (per lane mile)	Environment & Transportation	Government Administration
Poverty rate			508.1*** (3.26)			
Percent with bachelor's degree or higher			28.2 (0.12)			
Hospital spending indicator variable			359.8 (18.27)			
Average annual snowfall, in inches				303.3*** (9.45)		
Per-capita federal aid, health and hospitals			1.924*** (4.68)			
Per-capita federal aid, public welfare			1.052*** (4.56)			
Per-capita federal aid, natural resources					1.75*** (29.74)	
Per-capita state aid, sewers					1.157** -29.74	
Per capita state aid, water					2.615 (0.98)	
City population		38.65*** (9.76)		5,6401*** (5.27)		75.63*** (14.71)
Per-capita state and federal aid, highways				109.1*** (7.64		
Per-capita state aid, other					-0.248*** (3.28)	
Per-capita federal aid, other						0.143.2*** (2.39)
Constant	26,329.2*** (8.64)	710.2*** (12.98)	-306.1** (2.11)	-83,100.11*** (6.26)	426.0*** (15.91)	-899.2*** (11.67)
Number of observations	2,212	2,212	2,197	2,212	2,212	2,212
Adjusted R-squared	0.564	0.514	0.623	0.210	0.472	0.307

Notes: t statistics in parentheses. *p<0.1, **p<0.05, ***p<0.01
All regressions, except for health and social services, estimated for 148 FiSCs, years: 2000–2014. Regression for health and social services excludes Gulfport, MS.
Column 3: Health and social services inludes local government spending on hospitals.
Column 5: Environment and Transportation excludes highway spending, but includes spending on sewage, sanitation, natural resources, housing, and community development.
Column 6: Government administration includes spending on general government and on debt service.

families headed by a female – a frequently used proxy for economic disadvantage – has a positive but insignificant sign, while the percentage of Hispanic population has a negative and significant sign.

The lack of significance for the female headship variable may reflect the fact that the dependent variable is educational *spending*, rather than a measure of educational *achievement*. The literature shows that it is more costly to educate students from disadvantaged households, but not that more resources are allocated. Economic disadvantage, though negatively correlated with the property base in cities (ρ = -0.29) is strongly positively correlated with per-capita intergovernmental aid (ρ = 0.53). The lack of significance for the percentage female headship suggests that the higher cost per student leads to a reduction in spending per student – a price effect – which is offset by higher levels of intergovernmental aid. The share of the population in the age 5–17 category (the workload effect) is positively correlated with the percentage of disadvantaged students. Thus expenditure need, which is a function of cost factors (plus resource controls) times workload, is a positive function of the percentage of female-headed households.

The negative effect for the percentage of Hispanic students reflects the negative correlation between the tax base and percentage of Hispanic households, but without the offsetting state aid effect.

For many school districts, the largest non-personnel educational costs are for the upkeep and maintenance of school facilities. These costs generally rise with the age of the facilities. Although we have no data on the age of school buildings, the age of school facilities is likely to parallel the age of residential buildings in each city. Consistent with this hypothesis, the percentage of housing units built before 1939 is positive and statistically significant.

The final cost factor in the education equation is the independent school district indicator, which is statistically significant with a negative sign, indicating higher costs in dependent school districts. In general, cities with dependent school districts are larger-than-average cities with independent districts that have higher costs for a set of reasons not fully captured by the other cost factors.

Cost factors identified in the public safety regression (column 2 of Table 1) are the comparative wage index, the percentage of female-headed households, the percentage of population age 65 or more, the ratio of urbanized area population to city population, and city size. A higher share of elderly raises the cost of providing ambulance and emergency medical services and could promote need for more extensive street patrols. Control variables are property values per capita, federal aid, and general-purpose state aid per capita.

The ratio of urban population to city population is a proxy for the number of commuters and other visitors to the city relative to the city population. We hypothesize that commuters and other city visitors raise the costs to the city for providing a range of public services, particularly sanitation, public safety, transportation, and street maintenance. The percentage of population age 65 or more reflects the fact that elderly people may both use more police and emergency services, and at the same time prefer higher spending on public safety, perhaps because of increased feelings of vulnerability.

Statistically significant cost factors in the health and social services regression (column 3 of Table 1) are the percentage of the population aged 65 or older and the poverty rate. The preference factor is the percentage with a bachelor's or a higher degree, and control variables are per-capita property values and state aid and federal aid per capita for health and welfare. Cost factors for highway spending per lane mile (column 4 of Table 1) include population density and annual average snowfall. Federal aid for highways is a highly significant factor as well, though this operates as a control in our model.

Cost factors in the broad spending category that includes environment and natural resources, transportation (except highways), housing and community development, and sewage and sanitation (column 5 of Table 1) are the ratio of urban area to city population and population density. Control variables include the per-capita market value of property and per-capita state and federal aid.

Statistically significant cost factors in the government administration regression (column 6 of Table 1) are the comparative wage index, the percentage of female-headed households, the percentage of housing units built before 1939, the percentages of the population aged 5 through 17 and 65 and older, the ratio of urban area to city population, and city population.

A cost index tells us how much more or less it costs the governments in a particular FiSC to provide a standard level of public services compared with governments that have average costs. The expenditure function regression coefficients allow us to quantify the magnitude of the contribution of each cost factor to the overall costs of providing a standard level of public services.

The relationship between the regression results and the calculation of cost indexes shows that hypothetical spending can be expressed as average per-capita spending across all FiSCs plus the sum of contributions to spending in each FiSC by each cost factor. The contributions of each cost factor to spending (positive or negative) are defined as the regression coefficient of each cost factor times the difference between the value of the cost factor in a given FiSC and the average value of the cost factor.

Table 2 illustrates the construction of cost indexes for public safety for five cities: Boston, Bridgeport, Philadelphia, Phoenix, and San Francisco. As shown in the cost index row, costs in Bridgeport are 39 percent above average, while in Phoenix costs are about average. In Philadelphia, all five cost factors are above average. In Phoenix, higher costs due to city size are offset by lower costs from female headship, the percentage of elderly residents, and the urban-to-city population ratio. In San Francisco, relatively low female headship is offset by a higher cost of living (as measured by the comparative wage index), as well as the percentage of elderly residents, city population, and the urban-to-city population ratio.[6]

6. In Table 2, the sum of the total contributions of cost factors and average spending are equal to hypothetical spending, and the cost index is defined as the ratio of hypothetical spending to average spending.

Table 2:
Calculation of Public Safety Cost Indexes for Selected FiSCs

	Regression Coefficients	Contribution of Cost Factors*				
		Boston, MA	Bridgeport, CT	Philadelphia, PA	Phoenix, AZ	San Francisco, CA
Cost Factors						
Comparable wage index	370.5	$59	$99	$38	$0	$111
Percentage female-headed households	936.3	$11	$85	$54	-$14	-$66
Percentage population 65 and older	828.3	-$9	-$9	$10	-$26	$24
City population	38.65	$34	-$22	$70	$67	$44
Urbanized area population / city population	25.74	$95	$84	$10	-$19	$25
Total contribution of cost factors		$191	$239	$181	$9	$139
*Hypothetical spending***		$803	$851	$794	$621	$752
Average per capita public safety spending		$613	$613	$613	$613	$613
Cost Index**		1.31	1.39	1.30	1.01	1.23
Actual per capita public safety spending+		$1,030	$716	$842	$662	$1,164

Notes: * Calculated as regression coefficient (individual city value of cost factor – average value of cost factor for 148 FiSCs).
** Hypothetical spending calculated as predicted spending, using actual values of cost factors and average values of control variables.
*** The cost index is the sum of the contribution of cost factors and average spending divided by average spending. It is equivalent to hypothetical spending in a city divided by hypothetical spending in a city with average costs.
+ Average of 15 years.

In Table 3, we provide summary statistics on the cost indexes for each of our six expenditure categories. Cost index values vary substantially across the 148 municipalities. Measured by the standard deviation (in this case, equal to the coefficient of variation), **the variation in cost indexes is largest for highways, public safety, and public administration and smallest for education, health and social services, and environment and transportation.**

The bottom panel lists cost index values for the five FiSCs in Table 2 plus Cleveland and Nashville (outliers that offer some useful insights). The cost indexes vary across cities and by type of expenditure. For example, in Philadelphia costs for public administration, public safety, and highways are quite high, but the cost for education is average.

Using our cost indexes, we calculate expenditure needs separately for each of the six expenditure categories, and then add up the results to obtain a single estimate of each FiSC's expenditure needs. For each category of expenditures other than education and highways, we define our spending norm as the average per-capita level of spending in 2000 (see Table 4) and in 2014 (see Table 5).

For these spending categories, we calculate expenditure needs for each FiSC by multiplying average per-capita spending and the value of its appropriate cost index. For education, we multiply the product of average education spending per school-aged child and the cost index by a service responsibility or workload index – namely, the school-aged child population ratio for each FiSC relative to the FiSC average ratio. For highways, we multiply the product of average spending per lane mile and the cost index by the ratio of lane miles to population relative to the average lane mile–population ratio.

Tables 4 and 5 provide descriptive statistics for expenditure needs for the six expenditure categories and in the last column, for total expenditures. Per-capita expenditure needs grew from $4,417 in 2000 to $4,785 in 2014. The coefficient of variation was about the same in the two years, about 10 percent of the mean. Among the seven FiSCs listed in the bottom panel of Table 5, expenditure needs varied from $4,506 in Nashville to $5,680 in Bridgeport.

4. Calculating Revenue-Raising Capacity

Summary statistics for our tax capacity and overall revenue-raising capacity measures are presented in Tables 6 and 7.

Between 2000 and 2014, real average tax capacity grew by 25 percent, along with a slight increase in variation across cities. The third column in Tables 6 and 7 displays descriptive statistics for own-source revenue-raising capacity, calculated by adding user-charge capacity to tax capacity. The fourth column shows per-capita revenue from state and federal intergovernmental grants, while the last column displays the sum of actual own-source revenue capacity and grants.

Both own-source revenue capacity, and state and federal per-capita grants are unequally distributed across the 148 FiSCs. There is a weak negative correlation between actual own-source revenue-raising capacity and transfers (ρ = -0.183 in 2014). On the whole, transfers are equalizing in the sense that the coefficient of variation of post-transfer

Table 3:
Cost Indexes by Spending Category, 148 FiSCs

	Education			Public Safety	Health & Social Services	Highways			Environment & Transportation	Public Administration
		Students per capita					Lane miles per capita			
		2000	2014				2000	2014		
Summary Statistics										
Average	1.00	0.153	0.131	1.00	1.00	1.00	0.010	0.009	1.00	1.00
Standard deviation	0.03	0.028	0.029	0.18	0.06	0.47	0.007	0.006	0.11	0.22
Minimum	0.86	0.045	0.061	0.62	0.84	0.35	0.001	0.001	0.88	0.54
Maximum	1.10	0.226	0.203	1.58	1.17	3.92	0.060	0.059	1.51	1.75
Selected FiSCs										
Boston, MA	1.04	0.128	0.102	1.31	0.98	2.18	0.004	0.003	1.21	1.50
Bridgeport, CT	0.97	0.187	0.142	1.39	0.96	1.47	0.005	0.013	1.17	1.27
Cleveland, OH	1.06	0.160	0.116	1.23	1.05	1.53	0.003	0.003	1.06	1.18
Nashville, TN	1.00	0.131	0.119	0.96	0.98	0.74	0.012	0.010	0.91	1.05
Philadelphia, PA	1.00	0.135	0.107	1.30	1.05	2.02	0.004	0.004	1.06	1.40
Phoenix, AZ	0.96	0.168	0.139	1.01	0.95	0.94	0.006	0.008	0.96	1.10
San Francisco, CA	1.00	0.079	0.122	1.23	1.02	2.32	0.003	0.005	1.12	1.64

Table 4:
Expenditure Needs, 2000, 148 FiSCs

	Education	Public Safety	Health & Social Services	Highways	Environment & Transportation	Public Administration	Total Expenditure Needs
Summary statistics							
Average	$1,622	$556	$602	$184	$1,101	$536	$4,417
Standard deviation	$296	$101	$33	$113	$122	$116	$451
Minimum	$494	$342	$508	$26	$968	$289	$2,956
Maximum	$2,415	$879	$702	$967	$1,665	$940	$5,699
Selected FiSCs							
Boston, MA	$1,412	$729	$588	$159	$1,335	$806	$4,870
Bridgeport, CT	$1,914	$772	$575	$144	$1,292	$679	$5,233
Cleveland, OH	$1,813	$683	$632	$77	$1,163	$630	$4,922
Nashville, TN	$1,390	$533	$591	$177	$1,004	$560	$4,079
Philadelphia, PA	$1,428	$720	$622	$161	$1,167	$752	$4,688
Phoenix, AZ	$1,709	$564	$569	$114	$1,059	$589	$4,490
San Francisco, CA	$833	$682	$611	$130	$1,230	$877	$4,234

Table 5:
Expenditure Needs, 2014, 148 FiSCs

	Education	Public Safety	Health & Social Services	Highways	Environment & Transportation	Public Administration	Total Expenditure Needs
Summary statistics							
Average	$1,654	$647	$701	$204	$1,244	$538	$4,785
Standard deviation	$353	$118	$39	$126	$138	$117	$454
Minimum	$791	$399	$592	$28	$1,093	$290	$3,558
Maximum	$2,569	$1,024	$818	$1,147	$1,879	$944	$6,102
Selected FiSCs							
Boston, MA	$1,332	$849	$685	$176	$1,508	$810	$5,183
Bridgeport, CT	$1,969	$900	$670	$166	$1,459	$682	$5,680
Cleveland, OH	$1,558	$796	$737	$116	$1,313	$633	$5,038
Nashville, TN	$1,499	$621	$690	$186	$1,133	$563	$4,506
Philadelphia, PA	$1,341	$839	$733	$192	$1,317	$756	$4,985
Phoenix, AZ	$1,784	$657	$664	$120	$1,195	$592	$4,892
San Francisco, CA	$799	$795	$712	$147	$1,389	$882	$4,576

Table 6:
Revenue-Raising Capacity, 2000, 148 FiSCs

	Tax Capacity	User-Charge Capacity	Own-Source Revenue-Raising Capacity	Intergovernmental Transfers	Total Revenue-Raising Capacity
Summary statistics					
Average	$1,471	$488	$1,959	$1,818	$3,777
Standard deviation	$496	$83	$547	$809	$883
Coefficient of variation	0.338	0.170	0.279	0.445	0.234
Minimum	$560	$296	$933	$552	$2,124
Maximum	$3,605	$778	$4,147	$4,965	$7,220
Selected FiSCs					
Boston, MA	$1,954	$542	$2,496	$3,366	$5,862
Bridgeport, CT	$736	$415	$1,152	$2,971	$4,122
Cleveland, OH	$1,373	$366	$1,739	$2,558	$4,297
Nashville, TN	$2,005	$549	$2,554	$908	$3,462
Philadelphia, PA	$1,121	$405	$1,526	$2,982	$4,508
Phoenix, AZ	$1,210	$509	$1,719	$1,805	$3,524
San Francisco, CA	$2,310	$760	$3,070	$3,079	$6,150

Note: Tax capacity measures the capacity to raise revenue from the three major local government taxes – property, income, and sales.
User-charge capacity is measured relative to the average income in each FiSC. Own-source revenue-raising capacity is the sum of tax and user charge capacity.
Total revenue-raising capacity is the sum of own-source revenue-raising capacity and state and federal intergovernmental revenues.

Table 7:
Revenue-Raising Capacity, 2014, 148 FiSCs

	Tax Capacity	User-Charge Capacity	Own-Source Revenue-Raising Capacity	Intergovernmental Transfers	Total Revenue-Raising Capacity
Summary statistics					
Average	$2,274	$559	$2,833	$1,898	$4,731
Standard deviation	$876	$124	$963	$839	$1,155
Coefficient of variation	0.385	0.222	0.340	0.442	0.244
Minimum	$635	$297	$1,099	$670	$2,236
Maximum	$6,378	$1,062	$7,211	$4,469	$9,723
Selected FiSCs					
Boston, MA	$3,750	$723	$4,473	$1,983	$6,456
Bridgeport, CT	$1,681	$479	$2,160	$2,890	$5,050
Cleveland, OH	$1,541	$331	$1,872	$2,775	$4,647
Nashville, TN	$2,778	$593	$3,371	$1,024	$4,395
Philadelphia, PA	$1,618	$478	$2,096	$2,696	$4,792
Phoenix, AZ	$1,884	$562	$2,446	$1,511	$3,957
San Francisco, CA	$4,996	$1,012	$6,007	$3,715	$9,723

Note: Tax capacity measures the capacity to raise revenue from the three major local government taxes – property, income, and sales.
User-charge capacity is measured relative to the average income in each FiSC. Own-source revenue-raising capacity is the sum of tax and user charge capacity.
Total revenue-raising capacity is the sum of own-source revenue-raising capacity and state and federal intergovernmental revenues.

revenue-raising capacity is lower than the coefficient of variation of own-source revenue-raising capacity – in 2000, 0.28 versus 0.23, and in 2014, 0.34 before transfers and 0.24 after transfers. Thus the overall degree of revenue-capacity equalization has increased during this 15-year period.

It is interesting to compare Boston and San Francisco. In both cities, tax capacity grew rapidly between 2000 and 2014. In Boston, at least partially in response to this growth in capacity, real per-capita intergovernmental transfers declined by 41 percent from 2000 to 2014. Transfers also went down in Bridgeport, Philadelphia, and Phoenix. In San Francisco, however, per-capita transfers grew by 21 percent over this period, reinforcing the large increase in own-source revenue-raising capacity, and resulting in an exceptionally large increase in San Francisco's total revenue-raising capacity.

5. Results: The Calculation of Relative Fiscal Gaps

To determine the relative fiscal health of the 148 FiSCs in our sample, we first calculate fiscal gaps for each city by subtracting the sum of own-source revenue-raising capacity and intergovernmental transfers from expenditure needs. We then subtract the average fiscal gap for the entire sample from each city's fiscal gap. The results of these calculations for 2000 and 2014 are presented in Table 8.

Table 8:
Relative Fiscal Gaps, 2000 and 2014, 148 FiSCs

	2000	2014
Summary statistics		
Average	$0	$0
Standard deviation	$841	$1,200
Minimum	-$2,556	-$5,202
Maximum	$2,057	$2,864
Selected FiSCs		
Boston, MA	-$1,632	-$1,329
Bridgeport, CT	$471	$575
Cleveland, OH	-$15	$335
Nashville, TN	-$23	$55
Philadelphia, PA	-$459	$137
Phoenix, AZ	$326	$879
San Francisco, CA	-$2,556	-$5,202

Note: Relative fiscal gaps are defined as expenditure needs minus revenue-raising capacity, relative to the average gap. FiSCs with large positive values are in the weakest fiscal health.

By definition, the average relative fiscal gap is zero. The statistics on the standard deviation and range of these gaps demonstrate large variations in the fiscal health of American central cities. The larger the fiscal gap, the weaker the fiscal health of the fiscally standardized city. A large gap indicates that the exogenously determined expenditure needs of a city exceed its own-source revenue-raising capacity, supplemented by its actual receipt of grants from its state and the federal government, by an above-average amount. By contrast, FiSCs in relatively good fiscal health show a negative value for the fiscal gap.

The relative fiscal gaps displayed in Table 8 show that the variation among FiSCs in relative fiscal gaps grew between 2000 and 2014. The bottom panel of Table 8 displays the relative fiscal gaps of seven cities in both years. In relative terms, the fiscal health of Bridgeport, Cleveland, Philadelphia, and Phoenix worsened between 2000 and 2014. They moved from above-average to below-average fiscal health during this period. On the other hand, San Francisco, which was in in relatively strong fiscal health in 2000, grew fiscally stronger by 2014.

Table 9 lists the 10 FiSCs with the largest reductions in fiscal health (measured by changes in fiscal gaps) and the 10 FiSCs with the largest improvements in fiscal health between 2000 and 2014. **Most of the large changes in fiscal health can be explained by changes in cities' own-source revenue-raising capacity or changes in state aid, rather than through changes in expenditure needs.**

The fiscal health of Hartford declined because its own-source revenue-raising capacity was 26 percent lower in 2014 than it was in 2000, a reduction larger than in any other FiSC. Also contributing to its worsening fiscal condition was the reduction in its receipt of real per-capita state aid during this same period. The same two factors also explain Louisville's reduced fiscal health.

Table 9:
10 FiSCs with Largest Reductions in Relative Fiscal Health and 10 FiSCs with Largest Improvements in Relative Fiscal Health, 2000 to 2014

Reductions	Improvements
Hartford, CT	Santa Ana, CA
Aurora, IL	Fort Lauderdale, FL
Louisville, KY	Chicago, IL
Detroit MI	Bismarck, ND
Flint, MI	Fargo, ND
Grand Rapids, MI	Charleston, SC
Durham, NC	Austin, TX
Las Vegas, NV	Chesapeake, VA
Reno, NV	Virginia Beach, VA
Milwaukee, WI	Burlington, VT

The deteriorating fiscal condition in the three Michigan cities listed in Table 9 (Detroit, Flint, and Grand Rapids) can be attributed primarily to the absence of economic opportunity leading to sharp declines in both city population and employment. Although real per-capita incomes grew in all cities between 2000 and 2014, income growth was slower in Michigan cities than in nearly all other cities in our sample. The decline in the fiscal health of the three Michigan cities was moderated by the fact that measured expenditure needs for education declined between 2000 and 2014 as student enrolment relative to population fell sharply in all three cities. However, given the importance of fixed costs and state-imposed curriculum requirements, these reductions in "workload" are unlikely to translate into commensurate declines in actual costs.

In Nevada, Las Vegas and Reno were particularly hard hit by the Great Recession and property values in those cities fell dramatically. By 2014, their economies had not yet fully recovered. In Reno, revenue-raising capacity was actually lower in 2014 than in 2000. Expenditure needs also grew over this period, especially in Las Vegas.

The primary reason for Milwaukee's declining fiscal health was a 27 percent drop in real per-capita state aid between 2000 and 2014.

The FiSCs in which fiscal health improved most strongly generally experienced modest growth in their expenditure needs (with the exception of Bismarck), and above-average growth in either own-source revenue-raising capacity and in intergovernmental transfers or both. In Charleston, for example, real per-capita transfers were nearly 25 percent lower in 2014 compared with 2000, but the impact of these aid cuts was offset by extremely rapid economic growth.

6. Policy Discussion

In this section, we investigate the impacts of several public policies on the fiscal health of American central cities. We explore the role played by intergovernmental transfers from state and federal governments in reducing the fiscal disparities among central cities. We also investigate the importance of local government revenue diversification in influencing the fiscal health of central cities.

6.1 Fiscal equalization and intergovernmental transfers

The results shown in Table 8 demonstrate the large variation in the fiscal health of American central cities. Our measure of fiscal health – fiscal gaps – provides a good tool for quantifying *fiscal disparities* among large cities.

As Dafflon and Vaillancourt (2020) explain, fiscal disparities occur when, for reasons largely outside the control of local governments, there are differences in cities' ability to raise the revenues needed to meet their spending responsibilities. Since the mean values of relative fiscal gaps are zero by construction, a straightforward measure of fiscal disparities is the standard deviation of relative fiscal gaps. Between 2000 and 2014, the standard deviation of relative fiscal gaps rose from $841 to $1,200 (in 2014 U.S. dollars) an increase of 42.7 percent.

By definition, the variation in fiscal gaps reflects differences among cities in expenditure needs and own-source revenue-raising capacity (OSRRC), as well as differences in the receipt of state and federal grants. The United States stands out among developed nations in the absence of central government transfers to subnational governments designed explicitly to reduce fiscal disparities.

To highlight the impact of intergovernmental grants on fiscal disparities, we recalculated fiscal gaps excluding intergovernmental transfers. The standard deviation of the resulting relative fiscal gaps changed very little, indicating that **although intergovernmental transfers play an important role in *reducing* fiscal gaps, they were not sufficiently equalizing as to reduce the variation in relative fiscal gaps.** In the evolution of fiscal disparities between 2000 and 2014, two opposing forces were at work. First, the variation in own-source fiscal capacity increased, due to the uneven growth in tax bases across cities. Second, intergovernmental transfers were more equalizing with respect to fiscal capacity in 2014 than in 2000. The effect of greater grant equalization in the latter year, though sufficient to almost completely offset the **increase** in fiscal capacity variation, was not great enough to reduce the overall variation in fiscal capacity among central cities in the United States.

To further explore the role of intergovernmental transfers in reducing or exacerbating fiscal disparities among FiSCs, we calculated the ratio of grants to OSRRC separately for federal and state grants. Note that state aid, as measured by the Census Bureau, includes both direct aid from states to municipalities and federal aid, primarily for elementary and secondary education, which is "passed through" the states.[7]

In 2000, the ratio of federal aid to OSRRC was less than 5 percent in 20 cities and more than 30 percent in 12 cities. In Springfield, Detroit, and Philadelphia, federal aid was more than 50 percent of OSRRC. Cities that received the highest shares of federal aid relative to OSRRC in 2000 tended to experience the largest reductions in the ratio by 2014. The biggest increases were in Tampa and Oakland.

The ratio of state aid to OSRRC was less than 30 percent in 11 cities in 2000. That number grew to 27 cities in 2014, while in 24 cities, state aid was larger than OSRRC. In both years, Austin was the least dependent on state aid, while Buffalo was the most dependent.

The extent to which grants supplement OSRRC varies substantially across cities, mainly because of an increase in the variation of state grants. The coefficient of variation of total grants relative to OSRRC rose from 0.63 in 2000 to 0.77 in 2014. While the magnitude and distribution of federal grants remained largely unchanged, the increase in the coefficient of variation of state grants relative to OSRRC was substantial, rising from 0.66 in 2000 to 0.82 in 2014. This increase was accompanied by a decline in the average ratio of state grants to OSRRC from 0.89 to 0.66. Thus, the decline in average state grants relative to own-source revenue-raising capacity, coupled with changes in the equalizing nature of grants within and across states, left the role of grants in reducing fiscal disparities unchanged between 2000 and 2014.[8]

7. For example, the Census of Government data show that about 5 percent of revenues in New York City are transfers from the federal government. By contrast, the budget figures for the City of New York, as published by the Independent Budget Office, typically show federal grants comprising about 10 percent of total revenues.

8. These overall patterns regarding fiscal equalization are roughly consistent with the findings from Martinez-Vazquez and Timofeev (2022), using actual tax revenues as their measure of fiscal equity.

The dominant factor in determining a city's fiscal gap is the revenue-raising capacity of the city. For example, in 2014, the five cities with the highest total revenue-raising capacity (San Francisco, Seattle, New York City, Fremont, and Oakland), were the five cities in the best fiscal condition. By contrast, of the five cities with the highest expenditure needs (Hartford, Hialeah, Miami, Springfield, and Bridgeport), only Hialeah was among the five FiSCs in the weakest fiscal health, that is, with the largest fiscal gaps.

Miami is an example of a city with high expenditure needs (it ranks third among the cities), while its revenue-raising capacity is below the median.[9] Relative to the average, Miami's expenditure needs were particularly high for environment and public safety. For public safety, the contributing cost factors are a very high percentage of seniors in the population, and a very high ratio of metropolitan area population to city population. Thus, the combination of high expenditure needs and relatively low intergovernmental aid explains Miami's weak fiscal condition. It had the 37th largest fiscal gap, which placed it among the 25 percent of FiSCs in the weakest fiscal condition in 2014.

Table 10 highlights the different roles that intergovernmental grants to FiSC play in the country's four most populous states – California, Florida, New York, and Texas. The cities in these four states include 39 of the 148 cities in our sample. Given that state aid to cities is much larger than direct federal aid, the amounts and distribution of state aid within states are likely to have a major influence on fiscal disparities and the degree of fiscal equalization.[10]

The first six rows of Table 10 show the share of revenue-raising capacity from intergovernmental grants, with total, state, and federal aid shown separately for both 2000 and 2014. New York's FiSCs were the most heavily dependent on intergovernmental transfers in both years, with average shares of 67 and 64 percent. California was next at 56 and 46 percent. Intergovernmental transfers as a share of the total revenue-raising capacity of FiSCs were substantially lower in Florida and Texas, providing about 40 percent of revenue-raising capacity in 2000, and only about 33 percent in 2014.

In all four states, the relative importance of intergovernmental transfers declined between 2000 and 2014, with average shares dropping by 10 percentage points in California and Florida, and by 7 percentage points in Texas. The decline was much smaller in New York. Although federal aid shares increased in California and Florida while declining slightly in New York and Texas, these changes were swamped by the large reductions in the state aid shares in California, Florida, and Texas. The decreases were largest in Florida and California, with the average state aid share plunging by 14 and 12 percentage points, respectively.

As measured by changes in the coefficient of variation between 2000 and 2014, the decline in the average share of intergovernmental aid in revenue-raising capacity was accompanied by an increase in the variation across cities in New York, a small decrease in Texas, while remaining about the same in California and Florida.

9. Miami ranked 27th in tax capacity, but 109th in the ratio of intergovernmental revenues to OSRRC.

10. In a paper that focuses on provincial government to local government aid in Canada, Bird and Slack (2021) include a clear discussion of the reasons why the allocation of within-province (or state) transfers should account for differences in local government expenditure needs and fiscal resources.

Table 10 : Intergovernmental Grants to FiSCs in Four Large States, 2000 and 2014

	California		Florida		New York		Texas	
Number of FiSCs	16		8		5		10	
FiSC population as % of state pop.	29.2%		14.0%		47.0%		31.5%	
	Average	**Coefficient of Variation**	**Average**	**Coefficient of Variation**	**Average**	**Coefficient of Variation**	**Average**	**Coefficient of Variation**
Grants / total RRC, 2000	0.560	0.104	0.427	0.116	0.665	0.115	0.396	0.118
Grants / total RRC, 2014	0.464	0.119	0.320	0.112	0.636	0.173	0.330	0.090
Federal grants / total RRC, 2000	0.050	0.024	0.071	0.046	0.047	0.024	0.059	0.025
Federal grants / total RRC, 2014	0.071	0.060	0.104	0.068	0.031	0.028	0.053	0.014
State grants / total RRC, 2000	0.510	0.101	0.356	0.077	0.617	0.112	0.337	0.112
State grants / total RRC, 2014	0.393	0.110	0.216	0.063	0.605	0.187	0.277	0.092
	Correlation Coefficients							
Own-source RRC and total grants, 2000	-0.34		-0.23		-0.47		-0.79	
Own-source RRC and total grants, 2014	-0.28		0.03		-0.71		-0.76	
Own-source RRC and state grants, 2000	-0.44		-0.10		-0.77		-0.86	
Own-source RRC and state grants, 2014	-0.43		0.10		-0.88		-0.81	
Expenditure needs and total grants, 2000	0.39		0.70		0.90		0.49	
Expenditure needs and total grants, 2014	0.07		0.32		0.88		0.79	
Expenditure needs and state grants, 2000	0.52		0.56		0.85		0.54	
Expenditure needs and state grants, 2014	0.34		0.27		0.72		0.76	

Note: RRC = Revenue-raising capacity

The lower panel of Table 10 shows correlation coefficients (ρ) between OSRRC and grants, and between expenditure needs and grants. The more negative the correlation coefficient for OSRRC, and the more positive the coefficient for expenditure needs, the greater the equalizing effect of grants across cities within each state. Although the combined population of the FiSCs in the four states in Table 10 makes up less than half of the population of each state, it is nevertheless illuminating to compare the degree of fiscal equalization among cities within each state.

In 2000, the degree of state aid equalization with respect to own-source fiscal capacity was greatest in Texas and New York (ρ = -0.86 and -0.77, respectively). In California the correlation between state aid and OSRRC was negative, but about half the magnitude of the correlation coefficients in New York and Texas. Florida had very little equalization. As shown in the bottom half of the lower panel of Table 10, in 2000 the correlation coefficients of state aid and expenditure needs were all positive, suggesting that state grants were equalizing with respect to expenditure needs in all four states.

Changes in the correlation coefficients between 2000 and 2014 indicate changes in the degree of fiscal equalization across FiSCs in each state. The results suggest that fiscal capacity equalization decreased in Florida and Texas, increased in New York, and remained about the same in California. In Florida, the decrease in fiscal capacity equalization with respect to state aid was reinforced by a decrease in expenditure need equalization, with the latter coefficient decreasing from 0.56 to 0.27.

By contrast, in California and New York, fiscal capacity equalization remained about the same or increased, while expenditure need equalization declined. In Texas, fiscal capacity equalization declined slightly, while equalization based on expenditure need increased. Florida is thus the only one of the four states showing an unambiguous decline in fiscal equalization between 2000 and 2014. Combined with large cuts in the overall importance of state grants, as shown in the top panel of Table 10, these results suggest that the pattern of cuts in state aid in Florida decreased equity among cities, with fiscally advantaged cities facing smaller cuts in state aid than cities in weaker fiscal health.

To summarize, the role of state grants in the financing of cities differs substantially across the four largest states in the United States – California, New York, Texas, and Florida. Between 2000 and 2014, state grants decreased in all four states, a reflection of the lingering effect of the Great Recession on state government finances (Chernick, Reschovsky, and Newman 2021). Among these states, the greatest change between 2000 and 2014 was in Florida, which sharply reduced the overall fiscal role of grants across the board, while decreasing the equalizing role of grants. In California and Texas, grant shares decreased, but changes in equalizing effects were ambiguous because of opposing patterns of expenditure need and revenue-raising capacity equalization.

Our conclusions about the equalizing effects of state aid are at best suggestive, as they are based on a small number of cities and account for less than half of the population in each state. Nonetheless, the results show systematic differences across these four states in the overall role of state grants, the degree of equalization across cities, and the pattern of changes between 2000 and 2014.

6.2 Local government revenue diversification

In this section, we explore the extent to which revenue diversification by central-city governments can improve the fiscal condition of FiSCs. Only 13 of the 148 FiSCs levy taxes on property, individual incomes, and retail sales. In 27 FiSCs, the only major source of local tax revenue is the property tax. We are particularly interested in whether cities in poor fiscal health – those with large fiscal gaps – could improve their fiscal condition by diversifying their tax bases.

To address this question, we calculate each FiSC's *potential* revenue-raising capacity. In FiSCs that currently raise revenue from all three major tax bases, potential tax capacity is equal to actual tax capacity. For all other FiSCs, we apply the average tax rate for all FiSCs to their sales and income tax bases.[11] By definition, the difference between actual and potential tax capacity is largest in those FiSCs that currently raise all their tax revenues from the property tax.

With no change in expenditure needs, tax base diversification in the form of potential tax capacity would improve the fiscal health of most FiSCs. However, fiscal disparities among FiSCs would actually grow. In 2014, the switch from actual to potential revenue-raising capacity would have increased the standard deviation of relative fiscal gaps by 15.7 percent. We also investigated whether revenue diversification would be helpful for the 20 percent of FiSCs in the worst fiscal health in 2014. **Among the 30 FiSCs in the bottom quintile of fiscal health – those with the largest fiscal gaps – diversifying tax bases would have moved only seven FiSCs to a higher quintile. In other words, even using all three major local government revenue sources, most of these FiSCs would remain among the nation's central cities in the weakest fiscal health.**

In the United States, local governments have at best very limited control over the tax instruments they are allowed to use. In most states, adding a new tax requires the explicit approval of the state legislature. Even in states that do not follow Dillon's Rule – a legal principle that limits the fiscal authority of local governments – the ability of local governments to adopt new taxes is limited (Dougherty, Harding, and Reschovsky 2021).

Our results indicate that even if, despite strong political and legal obstacles, central-city governments were to expand their tax capacities, the basic pattern of fiscal disparities across U.S. central cities would not be greatly altered. This suggests that other fiscal policies, particularly changes in the amount and distribution of intergovernmental aid, are necessary to improve the fiscal condition of central cities and reduce fiscal disparities among cities.

7. Conclusions

This paper measures the fiscal health of American central cities, that is, the ability of cities to provide their residents and businesses with adequate public services at a reasonable rate of taxation. We build upon an extensive literature that estimates the gaps between cities'

11. For the property tax, we use the average rate among FiSCs that currently also raise revenues from the sales tax or the income tax or both.

expenditure needs and *revenue-raising capacity*. In the United States, with the exception of Ladd and Yinger (1989), there have been no nationwide studies of the fiscal health of central cities. This absence of studies undoubtedly reflects the difficulty of comparing revenues and expenditures across cities due to the great diversity in governmental organization and structure of local governments in the United States.

To address these difficulties, we developed the concept of *fiscally standardized cities* (FiSCs). Our FiSC dataset provides us with detailed revenue and expenditure data that reflect the total revenues raised on behalf of central-city residents and businesses and the public spending carried out on their behalf. Like previous researchers, we use a regression-based approach as the foundation for estimating cost indexes and calculating expenditure need. Our empirical approach, however, differs from previous studies in several important ways. Rather than using a single year of data on total per-capita expenditures, our expenditure need calculations are based on a 15-year panel of detailed fiscal and nonfiscal data that allow us to run regressions on six different categories of local government public spending.

Our measure of revenue-raising capacity also improves on that used in previous studies. We use data on the tax bases of the three major sources of local government tax revenue. Our measure of the single most important source of city tax revenue – the property tax – relies on each city's official estimate of the market value of its property tax base. Rather than assuming that user-charge capacity is equal to the revenue from user charges, we developed a user-charge capacity measure based on the ability to pay of city residents.

Our results show that a substantial number of U.S. cities are in weak fiscal health. In 2014, 23 cities had fiscal gaps that were greater than one standard deviation above the average gap. Fiscal disparities between relatively healthy and relatively unhealthy cities were substantial in both 2000 and 2014 and increased over that period. In 2014, relative expenditure needs exceeded total revenue-raising capacity by more than $1,000 per capita in 29 FiSCs.

At the same time, in 24 other cities, revenue-raising capacity was more than $1,000 greater than expenditure needs. Some cities, such as San Francisco, were in strong fiscal health in 2000 and improved their fiscal health by 2014. By contrast, Hartford experienced the largest reduction in fiscal health, with a large decrease in its revenue-raising capacity, primarily from own-source revenue, but also from intergovernmental grants.

The single most important reason for increased fiscal disparities between 2000 and 2014 is difference across cities in the growth of revenue-raising capacity. The component of revenue-raising capacity that grew the most was tax capacity, which increased by 55 percent in constant dollars over this period. The pattern of growth was uneven across cities, as demonstrated by a 14 percent increase in the coefficient of variation of tax capacity. In contrast to the robust growth in tax capacity, over the 15 years, real intergovernmental transfers increased by only 4 percent and the coefficient of variation remained largely unchanged. These differential growth patterns left the average city more dependent on own-source revenues in 2014 compared with the situation in 2000.

The patterns of change in expenditure needs were more muted, with the average per-capita expenditure need for the cities 8.3 percent higher in 2014 compared with that in 2000. The coefficient of variation of expenditure needs declined by 7 percent over this period. These differential patterns help to explain relative fiscal gaps. **Although high expenditure needs contribute to large fiscal gaps, of the five cities with the highest expenditure needs in 2014, only one was among the five cities with the largest relative fiscal gaps.** Most of the cities which experienced the largest decline in fiscal health between 2000 and 2014 suffered substantial reductions in their fiscal capacities.

We found that the extent to which grants supplement own-source revenue-raising capacity (OSRRC) varies substantially across cities. The coefficient of variation of grants relative to OSRRC, which was 0.63 in 2000, rose to 0.77 in 2014. This change was largely due to changes in the distributional pattern of grants from states to FiSCs. In our examination of grants to FiSCs in the nation's four most populous states, we found that grants were more important in city finance in California and New York than in Texas and Florida, with state aid as a share of revenue capacity at least 15 percentage points higher in California and New York than in Texas and Florida. Between 2000 and 2014, state grant shares decreased in all four states, a reflection of the lingering effect of the Great Recession on state government finances.

We also found differences across these four states in the equalizing role of state grants. In all of the FiSCs in Florida, real per-capita state aid was lower in 2014 than in 2000, and the distribution of state aid among the FiSCs increased disparities among cities relative to both fiscal capacity and expenditure needs. In California, Texas, and New York, equalizing patterns with respect to fiscal capacity were relatively unchanged, while expenditure need equalization decreased in California and New York but increased in Texas.

Our fiscal health measures are based on comparisons between central cities across the country. They ignore another important aspect of fiscal health: the fiscal health of the central city relative to the suburban areas of the metropolitan area. Despite some changes over time, poverty rates in central cities continue to be almost double the rates in suburbs (Berube and Murray 2017). Even though in our sample of central cities, poverty rates are not strongly correlated with revenue-raising capacity or fiscal health, the concentration of poverty in central cities suggests that despite the economic strength in some cities, on average central cities in the United States continue to be fiscally disadvantaged relative to their suburbs. Our measure of fiscal health is likely to understate the deterioration in the fiscal conditions between 2000 and 2014 in cities such as Hartford, Detroit, and Milwaukee, because their fiscal health has probably worsened relative to their suburbs.

Our measure of fiscal health, relative fiscal gaps, by design reflects characteristics of a central city that are largely outside the control of local government officials, at least in the short or medium term. Local government decisions to raise or lower taxes and user charges and change the level or mix of spending will not directly change a city's measured fiscal health. We have presented evidence that for most FiSCs, the largest changes in fiscal health between 2000 and 2014 were a result of changes (both positive and negative) in city's own-source revenue-raising capacity. These changes in fiscal capacity were, with a

few exceptions, caused not by the expansion of revenue sources, but by growth in the underlying tax bases.

As long as local governments provide public services in a reasonably efficient manner, they have very few policy instruments that can effectively influence economic development and thereby the growth of their tax bases, at least in the short to medium term. The implication is that substantial improvements in the fiscal health of many central cities that are currently in weak health will require the intervention of higher-level governments. Improving the fiscal health of central cities and reducing fiscal disparities among them will require substantial increases in intergovernmental transfers from the federal government and state governments.

While in the average FiSC, federal grants relative to own-source revenue-raising capacity remained relatively unchanged between 2000 and 2014, state aid relative to OSRRC was considerably lower in 2014 than it had been in 2000. In some states, such as Florida, state aid went from offsetting disparities between cities in OSRRC to reinforcing these disparities. In cities such as Detroit and Hartford, declines in state aid reinforced declines in local fiscal capacity, thus contributing to the decline in fiscal health caused by economic weakness.

We conclude with the recommendation that both states and the federal government re-examine their fiscal aid policies and try to maximize the extent to which federal and state dollars offset local fiscal disparities. While longer-run patterns of economic growth are the most important factor in determining fiscal health, in the short and medium term, federal and particularly state aid policies can make a significant difference in how well cities function. Given the high concentrations of poverty and other measures of individual need in central cities and the importance of good-quality public services for low-income residents of cities, fiscally equalizing grant allocations could and should play an important role in reinforcing and strengthening the nation's social safety net.

Appendix A: Calculating the Expenditure Needs of FiSCs

Per-capita expenditure needs (EN_i) of $FiSC_i$ are defined as

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

Total spending in each FiSC is divided into several functional categories, such as education, public safety, and transportation, represented by the subscript *j*. SR_{ij} is a service responsibility or *workload* indicator.

Because of the way FiSCs are constructed, in most cases, SR_{ij} takes a value of 1.0. For public services not measured in per-capita terms, namely, education, which is provided per student, and highway maintenance, which is provided per lane mile, SR_{ij} provides a workload indicator that links students and lane miles, respectively, to population.

S_j is a measure of a "standard" level of per-capita public service *j* within the United States. For the purposes of this analysis, we define the standard, S_j, as the average level of per-capita spending on public service *j* across all FiSCs. 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 FiSC *i* relative to the cost of delivering public services in a FiSC with average values of the statistically identified cost factors. The steps involved in constructing cost indices are described below.

The major methodological challenge in determining the cost of public service provision is disentangling data on actual spending into three parts: one that represents the costs of the service, another related to decisions of local governments on the quantity and quality of public services to provide, and a third reflecting efficiencies or inefficiencies in service provision in any one government in any particular city, relative to the average.

Because direct data on public service provision are not available, it is not possible to estimate true cost functions.[12] In this paper, we follow much of the literature and estimate *reduced form expenditure equations* as a means of identifying cost factors.[13] As with a cost function, the dependent variable in an expenditure equation is generally per-capita expenditures on a particular local government service or group of services. Public-sector efficiencies relative to the average, after taking account of cost differential, are reflected in the regression residuals. To the extent that cost differentials can be captured, positive residuals reflect inefficiency, and negative residuals reflect relative efficiency.

To test whether the correlation across error terms within cities in any given year is significant, we compared results using ordinary least squares to the method of seemingly unrelated regressions (SUR), which takes account of the error dependence. Chi square tests indicate that the error terms are correlated, with the highest correlation, between

12. Using data on student performance on standardized tests, Duncombe and Yinger (1997, 2000), and Imazeki and Reschovsky (2006) estimated cost functions for public education and used the results to calculate the expenditure needs of individual school districts.

13. See Bandyopadhyay and Rao (2008), Bradbury et al. (1984), Green and Reschovsky (1994), Ladd, Reschovsky, and Yinger (1991), Turley, Flannery, and McNena (2015), and Yan and Reschovsky (2021) for examples of empirical studies of municipal fiscal health based on cost indexes generated from the estimation of expenditure functions.

the residual category of administration and public safety, equal to 0.26. Based on a two-equation example from the Stata manual (Cameron and Trivedi 2010, 165), the implication is that the reduction in standard errors in each of the estimated equations from using the SUR method is no more than 2 percent. Hence, the results presented here are based on ordinary least squares regressions.

The estimated coefficients from an expenditure function can be used to construct a *cost index*. The basic idea is to calculate for each FiSC the level of "hypothetical" per-capita spending on each expenditure function, such as education, based on the actual values of the cost factors and the average values of a set of "control" variables that reflect factors unrelated to costs, but that influence the level of per-capita spending.[14]

Examples of control variables include measures of the tax base of each city, the receipt of intergovernmental aid, and explicit public-sector demand or preference variables. To construct a cost index value for each FiSC, we divide each FiSC's hypothetical spending on each function by average per-capita spending on that function across all FiSCs. The expenditure needs of each FiSC are calculated using equation (1).

14. For example, the fact that New York City spends more than most other cities on education per student is due in part to higher levels of state aid to education. In constructing the cost index for education, we ignore actual state aid and calculate hypothetical education spending in New York City under the assumption that it received the average level of state education aid across all FiSCs.

Appendix B: Calculating Revenue-Raising Capacity

Local government revenues come from three major sources: local taxes, user fees, and grants or transfers from higher-level governments. A standard way of measuring the capacity of local governments to raise revenue from taxes is to calculate the maximum amount of revenue each local government could raise if it imposed "standard" tax rates on a "standard" set of tax bases.

To have a valid measure of tax capacity, the definition of each tax base should be defined by a higher level of government, namely the state government. This approach to measuring revenue-raising capacity (RRC) is known as the *representative tax system* (RTS). The standard tax bases include all the taxes or other revenue sources used by local governments. The "standard" tax rates can be set equal to the average rates used by all local governments in FiSCs, or an alternative percentile standard. In general terms, capacity in local government *i* is defined as the weighted sum of *N* potential tax bases, where the weight for each base *j* is the standard tax rate t^*_j for tax *j*.[15]

(2) $RRC_i = \sum t^*_j BASE_{ij}$

According to equation (2), the actual revenue collected by local government *i* could be above or below *i*'s revenue-raising capacity if the tax rate used by local governments *i* was either greater than or less than t*.

Our approach to calculating revenue-raising capacity takes account of the fact that many local governments are restricted by their state government in their choice of tax bases.[16] The three major sources of tax revenue of local governments in the United States – the property tax, the general sales tax, and the income tax – account for about 90 percent of all tax revenues collected by local governments. While all the cities in our sample can access the property tax, in 2000, only 104 of the FiSCs used a local sales tax; by 2014, that number had risen to 111. An income or earnings tax was used in only 22 FiSCs in 2000 and only 23 in 2014. In both years, only 13 FiSCs raised revenues from all three major taxes.

To compare fiscal capacity in cities with differential tax access, we take account of the fact that cities with more restricted tax access are likely to impose higher tax rates on the tax bases they can use than cities with more diversified tax systems. Hence, for the cities that rely solely on the property tax, we use the average property tax rate among those cities, and similarly for cities that use general sales taxes or income taxes or both, we use the average property tax rate among cities with diversified bases. In 2014, the two average property tax rates were 2.45 (for cities using only the property tax) and 2.38 percent (for cities with a more diversified tax base).

Although the property tax is levied on the assessed value of real property, city governments are generally required to provide an estimate of the true market value of taxable property in their Consolidated Annual Fiscal Reports (CAFRs). We have obtained these data directly from CAFRs or from city officials, if these data were not included

15. For a detailed discussion of the measurement of revenue-raising capacity see Chernick (1998).

16. For example, in Massachusetts, cities have no access to sales or income taxes.

in their CAFRs. Because data on actual sales and income tax bases are not available for individual cities, we base our tax-capacity measures on Census Bureau data on total retail sales per capita and on average per-capita income for persons age 15 and over.

In the case of the sales and income taxes, the tax bases we use are not the *actual* tax bases. Thus, our sales tax base measure – total retail sales – includes many goods and services that are exempt from sales tax in many states. On the other hand, cities that typically adhere to their state's definition of taxable sales, generally collected sales taxes on at least a portion of purchases made by businesses. These taxable sales are not included in the Census Bureau definition of retail sales. Likewise, the Census Bureau definition of income is more comprehensive that the definition of income subject to taxation used by local governments.

For each tax base, we calculate the tax rate in each FiSC as the revenue raised from that tax divided by the tax base. Because they are related to property, we add user-fee revenue from sewer and waste management to property tax revenue in calculating property tax rates. For sales and income tax capacity, the average tax rates are based on those FiSCs using each tax.

In addition to taxes, local governments also raise revenues from user fees and charges, and from licenses, permits, and fines. Measuring the capacity for raising revenues from these sources is difficult, because the base for the various revenue streams is not well defined, either conceptually or empirically.[17] Dependence on charges varies widely across cities, ranging (in 2014) from $221 per capita in Provo (Utah) to more than $2,400 in Long Beach, Atlanta, and San Francisco.

The contribution of user fees to local government revenue-raising capacity is problematic. Previous studies have either ignored fees and charges or assumed that fee capacity could be measured using actual revenue from fees. Some states limit revenue from fees to the costs of providing the goods or services for which a fee is charged. While most fees and charges are probably paid by central-city residents, some are paid by businesses and by non-residents. Despite these challenges, we have adopted the following approach. First, we subtract hospital-related charges, because these charges are typically paid for by federal medical insurance programs, namely Medicaid and Medicare. We then subtract charges for sewerage and solid waste, which we treat as additions to the property tax. The remaining charges are mostly paid by local residents. Hence, we use personal income per capita as the broadest available measure of ability to pay this set of charges.[18] In 2000, charges were 1.4 percent of income in the average FiSC. The average rate was 0.8 percent in 2014.

17. An approach used by one of the authors in a study of fiscal capacity in Italian municipalities (Chernick and Piazza 2016) has been to use the actual amount of revenues raised, under the assumption (reasonable for Italy) that all jurisdictions impose the maximum charges to which they are legally entitled.

18. In a small number of cities (San Francisco, Denver, Atlanta, and Long Beach), charges for airports and ports make up more than half of all user-charge revenues. A portion of these charges are borne by non-residents. In addition, in some cities, such as New York and Philadelphia, charges for airports and ports are levied by state agencies, and hence are not part of the FiSC data. Given these complexities, in calculating the role of charges in the fiscal capacity measure, we chose not to apply any special treatment to cities with large airport or seaport charges.

Appendix C: Data Sources

Our analysis is conducted for 148 fiscally standardized cities (FiSC).[19] Table 11 presents standard summary statistics for 2014. The top portion of the table lists per-capita expenditures (operating and capital) for six all-inclusive functional categories of spending. For education, public safety, environment, and administration, standard deviations range from 28 to 40 percent of the means.

For social services and for highways, the standard deviations are larger than the means. As a measure of the potential tax bases, the table also lists the per-capita market value property, total retail sales per capita, and the per-capita income of persons 15 years and older. The market value data come primarily from city Consolidated Annual Fiscal Reports. The retail sales data come from the economic census conducted once every five years by the U.S. Census Bureau. Data on per-capita incomes are from the Census Bureau's *American Community Surveys.*

The bottom portion of Table 11 provides summary statistics for a set of variables that we used in estimating expenditure functions as part of the process of determining the expenditure needs of FiSCs. The data come from the U.S. Census Bureau.

19. The District of Columbia and Gary, Indiana, are excluded from our sample, because there is no overlying state for the District of Columbia and because market value data were not available for Gary. The city of New Orleans is excluded from the sample for the years 2007–14, because the data are unreliable for the post-hurricane Katrina period.

Table 11: Summary Statistics, 147 FiSCs, 2014				
Variables	**Mean**	**Standard Deviation**	**Mini-mum**	**Maxi-mum**
Expenditure by function				
Education per school-aged child	$12,803	$3,620	$5,986	$25,942
Public safety per capita	$685	$205	$293	$1,349
Health and social services per capita	$701	$851	$0	$5,429
Highways per lane mile	$37,427	$47,586	$1,938	$368,005
Environment, natural resources, other transportation, housing, and community development per capita	$1,243	$581	$380	$3,333
Government administration, general government, and debt service per capita	$539	$216	$171	$1,246
Per-capita tax base				
Market value of property	$76,299	$34,140	$12,032	$196,119
Total sales	$16,818	$7,869	$4,897	$64,738
Income of persons 15 years and over	$65,993	$14,702	$35,046	$125,386
Cost factors and control variables				
City population	451,052	821,363	16,116	8,436,047
Population density	4,055	3,496	177	27,807
Percentage of population 5–17 years	12.4%	2.0%	7.0%	18.0%
Percentage of female-headed households	15.7%	4.6%	6.7%	30.4%
Percentage of population 65 and over	12.3%	2.3%	6.1%	19.6%
Percentage Hispanics	19.4%	18.4%	1.3%	96.3%
Poverty rate	21.0%	6.6%	6.1%	41.2%
Percentage with bachelor's degree or higher	19.2%	5.5%	7.2%	35.0%
Percent of housing units built before 1939	18.1%	16.5%	0.4%	64.2%
Urbanized area population / city population, 2010	3.22	2.37	0.87	13.95
Indicator variable: independent school district	0.776	0.419	0	1
Comparable wage index	0.999	0.099	0.801	1.334
Average annual snowfall, in inches	24.1	29.4	0.0	212.0
Hospital spending indicator variable	0.449	0.499	0	1
Per-capita state and federal aid, education	$1,100	$558	$325	$3,255
Per-capita state and federal aid, highways	$73	$81	$0	$693
Per-capita state aid, general support	$131	$164	$0	$820
Per-capita state aid, health and hospitals	$65	$97	$0	$533
Per-capita state aid, welfare	$126	$229	$0	$1,310
Per-capita state aid, sewers	$5	$20	$0	$174
Per-capita state aid, water supply	$1	$3	-$2	$28
Per-capita state aid, all other	$126	$121	$2	$598
Per-capita federal aid, public welfare	$6	$14	$0	$88
Per-capita federal aid, water, sewers, natural resources	$193	$214	$0	$1,738
Per-capita federal aid, health and hospitals	$9	$18	$0	$111
Per-capita federal aid, all other	$38	$57	$0	$414

References

Bandyopadhyay, Simanti, and M. Govinda Rao. 2008. "Fiscal health of selected Indian Cities." Paper prepared for the International Seminar on Fiscal Health of Cities, World Bank Institute, Washington, D.C., April 24–25, 2008. New Delhi: National Institute of Public Finance and Policy.

Berube, Alan, and Cecile Murray. 2017. "Three charts showing you poverty rates in U.S. Cities and metro areas." Brookings Institute blog, September 14. Retrieved from https://www.brookings.edu/blog/the-avenue/2017/09/14/three-charts-showing-you-poverty-in-u-s-cities-and-metro-areas/

Bird, Richard M. 2015. "Reflections on measuring urban fiscal health." In Richard M. Bird and Enid Slack (eds.), *Is Your City Healthy? Measuring Urban Fiscal Health*, 11–42. Toronto: Institute on Municipal Finance and Governance.

Bird, Richard M., and Enid Slack. 2021. *Provincial-Local Equalization in Canada: Time for a Change?* IMFG Papers on Municipal Finance and Governance, No. 57. Toronto: University of Toronto, Institute on Municipal Finance and Governance.

Boadway, Robin, and Frank Flatters. 1982. "Efficiency and equalization payments in a federal system of government: A synthesis and extension of recent results." *Canadian Journal of Economics* 15(4): 613–33.

Bradbury, Katharine L., Helen F. Ladd, Mark Perrault, Andrew Reschovsky, and John Yinger. 1984. "State aid to offset fiscal disparities across communities." *National Tax Journal* 37(2): 151–70.

Bradbury, Katharine, and Bo Zhao. 2009. "Measuring non-school fiscal disparities among municipalities." *National Tax Journal* 62(1): 25–56.

Buchanan, James M. 1950. "Federalism and fiscal equity." *American Economic Review* 40(4): 583–99.

Buchanan, James M. 1952. "Central grants and resource allocation." *Journal of Political Economy* 60(3): 208–17.

Cameron, Colin, and Pravin Trivedi. 2010. *Microeconometrics Using Stata*, revised edition. College Station, Texas: Stata Press.

Chernick, Howard. 1998. "Fiscal capacity in New York: The city versus the region." *National Tax Journal* 51(3): 531–40.

Chernick, Howard. 2017. "Evaluating the effect of differences in revenue systems on the fiscal health of large U.S. cities." Working Paper WQ17HC1. Cambridge, MA: Lincoln Institute of Land Policy.

Chernick, Howard, Adam H. Langley, and Andrew Reschovsky. 2015. "Comparing central city finances using fiscally standardized cities." *Journal of Comparative Policy Analysis: Research and Practice* 17(4): 430–40.

Chernick, Howard, and Santino Piazza. 2016. "Fiscal gaps in northern Italian cities: The case of Turin and Genoa." *Economia Publica* (Dimensione Ottimale degli enti Locali e Risparmi di Spesa Pubblica), special issue.

Chernick, Howard, and Andrew Reschovsky. 2006. "Local public finance: Issues for metropolitan regions." In *Competitive Cities in the Global Economy*, 417–32. OECD Territorial Reviews. Paris: Organisation for Economic Co-operation and Development.

Chernick, Howard, and Andrew Reschovsky. 2015. "The fiscal health of U.S. cities." In Richard M. Bird and Enid Slack (eds.), *Is Your City Healthy? Measuring Urban Fiscal Health,* 83–118. Toronto: Institute of Municipal Finance and Governance.

Chernick, Howard, and Andrew Reschovsky. 2017. "The fiscal condition of U.S. cities: Revenues, expenditures, and the 'Great Recession.'" *Journal of Urban Affairs* 39(4): 488–505.

Chernick, Howard, Andrew Reschovsky, and Sandra Newman. 2021. "The effect of the housing crisis on the finances of central cities." *Journal of Housing Economics* 54 (December): 1–15.

Dafflon, Bernard, and François Vaillancourt. 2020. "The practice of fiscal equalization: A political economy clarification." In Serdar Yilmaz and Farah Zahir (eds.), *Intergovernmental Transfers in Federations*, 41–63. Cheltenham, UK and Northampton, MA: Edward Elgar Publishing.

Dougherty, Sean, Michelle Harding, and Andrew Reschovsky. 2021. "Twenty years of tax autonomy across levels of government: Measurement and applications," In Sean Dougherty and Junghun Kim (eds.), *Fiscal Federalism 2022: Making Decentralisation Work,* 79–108. Paris: OECD Publishing.

Duncombe, William, and John Yinger. 1997. "Why is it so hard to help central city schools?" *Journal of Policy Analysis and Management* 16(1): 85–113.

Duncombe, William, and John Yinger. 2000. "Financing higher student performance standards: The case of New York State." *Economics of Education Review* 19(4): 363–86.

Federal Bureau of Investigation. 2016. *2015 Crime in the United States*. "Violent crime, Table 8: Offenses known to law enforcement by state and city, 2015." Retrieved from https://ucr.fbi.gov/crime-in-the-u.s/2015/crime-in-the-u.s.-2015/tables/table-8/table_8_offenses_known_to_law_enforcement_by _state_by_city_2015.xls/view.

Flatters, Frank, Vernon Henderson, and Peter Mieszkowski. 1974. "Public goods, efficiency, and regional fiscal equalization." *Journal of Public Economics* 3(2): 99–112.

Gordon, Tracy, Richard Auxier, and John Iselin. 2016. "Assessing fiscal capacities of states: A representative revenue system – representative expenditure system approach, fiscal year 2012." Research Report. Washington, D.C.: The Urban Institute.

Green, Richard, and Andrew Reschovsky. 1994. "Fiscal assistance to local governments." In Donald Nichols (ed.), *Dollars and Sense: Policy Choice and the Wisconsin Budget*, Volume III, 91–117. Madison: The Robert M. La Follette Institute of Public Affairs.

Hoene, Christopher, and Michael A. Pagano. 2010. "States and the fiscal policy space of cities." In Michael Bell, David Brunori, and Joan Youngman (eds.), *The Property Tax and Local Autonomy,* 243–84. Cambridge, MA: Lincoln Institute of Land Policy.

Imazeki, Jennifer, and Andrew Reschovsky. 2006. "Does No Child Left Behind place a fiscal burden on states? Evidence from Texas." *Education Finance and Policy* 1(2): 217–46.

Ladd, Helen F., Andrew Reschovsky, and John Yinger. 1991. "City fiscal condition and state equalizing aid: The case of Minnesota." Proceedings of the 84th Conference on Taxation of the National Tax Association, 42–49. Williamsburg, Virginia: National Tax Association.

Ladd, Helen F., and John Yinger. 1989. *America's Ailing Cities: Fiscal Health and the Design of Urban Policy*. Baltimore: Johns Hopkins University Press.

Langley, Adam H. 2020. "Methodology used to create the Fiscally Standardized Cities database." Working Paper WP20AL1. Cambridge, MA: Lincoln Institute of Land Policy.

Martinez-Vazquez, Jorge and Andrey Timofeev. 2022. "The long and winding road to local fiscal equity in the United States: A fifty-year retrospective." *Jahrbücher für Nationalōnomie und Statistik* 242(5–6): 569–608.

National Center for Education Statistics. 2017. "Common core of data, data table: Number of students and selected high school dropout and completion statistics for the 100 largest public elementary and secondary school districts in the United States and jurisdictions: School year 2009–10." Retrieved from https://nces.ed.gov/ccd/tables/2009-10_Dropout_and_completer_data_for_100_LSD_table.asp

Reschovsky, Andrew. 2007. "Compensating local governments for differences in expenditure needs in a horizontal fiscal equalization program." In Robin Boadway and Anwar Shah (eds.), *Intergovernmental Fiscal Transfers: Principles and Practice*, 397–424. Public Sector Governance and Accountability Series. Washington, D.C.: The World Bank.

Slack, Enid, Almos Tassonyi, and David Grad. 2015. "Fiscal health of Ontario large cities: Is there something to worry about?" In Richard M. Bird and Enid Slack (eds.), *Is Your City Healthy? Measuring Urban Fiscal Health,* 149–99. Toronto: Institute on Municipal Finance and Governance.

Taylor, Lori L., and Mark C. Glander. 2006. *Documentation for the NCES Comparable Wage Index Data File* (EFSC 2006-865). U.S. Department of Education. Washington, D.C.: National Center for Education Statistics.

Turley, Gerard, Darragh Flannery, and Stephen McNena. 2015. "A needs and resources assessment of fiscal equalisation in the Irish local government system." *Economics and Social Review* 46(3): 459–84.

Yan, Yan, and Andrew Reschovsky. 2021. "Fiscal disparities among local governments in Zhejiang Province, China." *Journal of Urban Affairs*, published online, January 5. Retrieved from https://www.tandfonline.com/doi/full/10.1080/07352166.2020.1851138

IMFG Papers on Municipal Finance and Governance

1. *Are There Trends in Local Finance? A Cautionary Note on Comparative Studies and Normative Models of Local Government Finance*, by Richard M. Bird, 2011.
   ISBN 978-0-7727-0864-9
2. *The Property Tax – in Theory and Practice*, by Enid Slack, 2011.
   ISBN 978-0-7727-0866-3
3. *Financing Large Cities and Metropolitan Areas*, by Enid Slack, 2011.
   ISBN 978-0-7727-0868-7
4. *Coping with Change: The Need to Restructure Urban Governance and Finance in India*, by M. Govinda Rao and Richard M. Bird, 2011.
   ISBN 978-0-7727-0870-0
5. *Revenue Diversification in Large U.S. Cities*, by Howard Chernick, Adam Langley, and Andrew Reschovsky, 2011.
   ISBN 978-0-7727-0870-4
6. *Subnational Taxation in Large Emerging Countries: BRIC Plus One*, by Richard M. Bird, 2012.
   ISBN 978-0-7727- 0874-8
7. *You Get What You Pay For: How Nordic Cities are Fin*anced, by Jorgen Lotz, 2012.
   ISBN 978-0-7727-0876-2
8. *Property Tax Reform in Vietnam: A Work in Progress*, by Hong-Loan Trinh and William J. McCluskey, 2012.
   ISBN 978-0-7727-0878-6
9. IMFG Graduate Student Papers. *Development Charges across Canada: An Underutilized Growth Management Tool?* by Mia Baumeister; *Preparing for the Costs of Extreme Weather in Canadian Cities: Issues, Tools, Ideas,* by Cayley Burgess, 2012.
   ISBN 978-0-7727-0880-9
10. *The Reform of Business Property Tax in Ontario: An Evaluation*, by Michael Smart, 2012.
    ISBN 978-0-7727-0882-3
11. *Hungary: An Unfinished Decentralization?* by Izabella Barati-Stec, 2012.
    ISBN 978-0-7727-0884-7
12. *Economies of Scale in Fire and Police Services*, by Adam Found, 2012.
    ISBN 978-0-7727-0886-1
13. *Trading Density for Benefits: Toronto and Vancouver Compared*, by Aaron A. Moore, 2013.
    ISBN 978-0-7727-0901-1
14. *Merging Municipalities: Is Bigger Better?* by Enid Slack and Richard M. Bird, 2013.
    ISBN 978-0-7727-0903-5
15. *Public Finance and the Politics of Scale in Montréal: Will the Proposed Reforms Save the Megacity?* by Jean-Philippe Meloche and François Vaillancourt, 2013.
    ISBN 978-0-7727-0915-8
16. *Decentralization and Infrastructure in Developing Countries: Reconciling Principles and Practice*, by Roy Bahl and Richard M. Bird, 2013.
    ISBN 978-0-7727-0919-6

17. *Provincial-Municipal Relations in Ontario: Approaching an Inflection Po*int, by André Côté and Michael Fenn, 2014.
ISBN 978-0-7727-0923-3

18. *A Better Local Business Tax: The BVT,* by Richard M. Bird, 2014.
ISBN 978-0-7727-0921-9

19. *Cooperation and Capacity: Inter-Municipal Agreements in Canada,* by Zachary Spicer, 2015.
ISBN 978-0-7727-0934-9

20. *Can GTA Municipalities Raise Property Taxes? An Analysis of Tax Competition and Revenue Hills,* by Almos Tassonyi, Richard Bird, and Enid Slack, 2015.
ISBN 978-0-7727-0938-7

21. *How to Reform the Property Tax: Lessons from around the World,* by Enid Slack and Richard M. Bird, 2015.
ISBN 978-0-7727-0943-1

22. *A Good Crisis: Canadian Municipal Credit Conditions After the Lehman Brothers Bankruptcy*, by Kyle Hanniman, 2015.
ISBN 978-0-7727-0945-5

23. *Municipal Employee Pension Plans in Canada: An Overview*, by Bob Baldwin, 2015.
ISBN 978-0-7727-0949-3

24. *Cities, Data, and Digital Innovation*, by Mark Kleinman, 2016.
ISBN 978-0-7727-0951-6

25. *Can Tax Increment Financing Support Transportation Infrastructure Investment?* by Murtaza Haider and Liam Donaldson, 2016.
ISBN 978-0-7727-0953-0

26. *Good Governance at the Local Level: Meaning and Measurement,* by Zack Taylor, 2016.
ISBN 978-0-7727-0956-1

27. *More Tax Sources for Canada's Largest Cities: Why, What, and How?* by Harry Kitchen and Enid Slack, 2016.
ISBN 978-0-7727-0959-2

28. *Did the Land Transfer Tax Reduce Housing Sales in Toronto?* by Murtaza Haider, Amar Anwar, and Cynthia Holmes, 2016.
ISBN 978-0-7727-0961-5

29. *Financing the Golden Age: Municipal Finance in Toronto 1950-1975*, by Richard White, 2016.
ISBN 978-0-7727-0971-4

30. *Climate Change, Floods, and Municipal Risk Sharing*, by Daniel Henstra and Jason Thistlethwaite, 2017.
ISBN 978-0-7727-0973-8

31. *The Evolving Role of City Managers and Chief Administrative Officers*, by Michael Fenn and David Siegel, 2017.
ISBN 978-0-7727-0977-6

32. *(Re)creating Boundary Lines: Assessing Toronto's Ward Boundary Review Process*, by Alexandra Flynn, 2017.
ISBN 978-0-7727-0979-0

33. *Land Value Capture and Social Benefits: Toronto and São Paulo Compared*, by Abigail Friendly, 2017.
ISBN 978-0-7727-0981-3

34. *Financing Urban Infrastructure in Canada: Who Should Pay?* by Enid Slack and Almos T. Tassonyi, 2017.
ISBN 978-0-7727-0989-9

35. *Paying for Water in Ontario's Cities: Past, Present, and Future*, by Harry Kitchen, 2017.
ISBN 978-0-7727-0991-2

36. *Re-imagining Community Councils in Canadian Local Government,* by Alexandra Flynn and Zachary Spicer, 2017.
ISBN 978-0-7727-0987-5

37. *Climate Finance for Canadian Cities: Is Debt Financing a Viable Alternative?* by Gustavo Carvalho, 2018.
ISBN 978-0-7727-0994-3

38. *The Public Finance Challenges of Fracking for Local Governments in the United States*, by Austin Zwick, 2018.
ISBN 978-0-7727-0996-7

39. *Returning to the Golden Rule of Balanced Budgets: The Institutional and Political Economy of Restricting Public Deficits and Debt*, by Bernard Dafflon, 2018.
ISBN 978-0-7727-0998-1

40. *The Platform Economy and Regulatory Disruption: Estimating the Impact on Municipal Revenue in Toronto*, by Zachary Spicer, 2018.
ISBN 978-0-7727-1005-5

41. *Development Charges in Ontario: Is Growth Paying for Growth?* by Adam Found, 2019.
ISBN 978-0-7727-1009-3

42. *Does Local Government Autonomy Promote Fiscal Sustainability? Lessons from Illinois's Home-Rule Municipalitie*s, by Matthew Walshe, 2019.
ISBN 978-0-7727-1011-6

43. *Mind the Funding Gap: Transit Financing in Los Angeles County and Metro Vancouver*, by Matthew Lesch, 2019.
ISBN 978-0-7727-1016-1

44. *The Practice of Municipal Cooperation: Australian Perspectives and Comparisons with Canada*, by Graham Sansom, 2019.
ISBN 978-0-7727-5502-5

45. *Filling the Gaps: The Role of Business Improvement Areas and Neighbourhood Associations in the City of Toronto,* by Alexandra Flynn, 2019.
ISBN 978-0-7727-1020-8

46. *The Fallacy of the "Creatures of the Provinces" Doctrine: Recognizing and Protecting Municipalities' Constitutional Status,* by Kristin R. Good, 2019.
ISBN 978-0-7727-1023-9

47. *Power and Purpose: Canadian Municipal Law in Transition,* by Zack Taylor and Alec Dobson, 2020.
ISBN 978-0-7727-1029-1

48. *Collaborative Regional Governance: Lessons from Greater Manchester,* by Alan Harding, 2020. ISBN 978-0-7727-2526-4
49. *Theme and Variations: Metropolitan Governance in Canada*, by Zack Taylor, 2020. ISBN 978-0-7727-2496-0
50. *Policy in Place: Revisiting Canada's Tri-Level Agreements,* by Neil Bradford, 2020. ISBN 978-0-7727-2523-3
51. *Cities in National Constitutions: Northern Stagnation, Southern Innovation,* by Ran Hirschl, 2020. ISBN 978-0-7727-2517-2
52. *Municipal Financing Opportunities in Canada: How Do Cities Use Their Fiscal Space?* by Jean-Philippe Meloche and François Vaillancourt, 2021. ISBN 978-0-7727-2532-5
53. *Developing Air and Land Control at Toronto's Airport: Local, Regional, and National Conflict and Cooperation, 1937–72*, by Nick Lombardo, 2021. ISBN 978-0-7727-2536-3
54. *Addressing the Fairness of Municipal User Fee Policy,* by Almos Tassonyi and Harry Kitchen, 2021. ISBN 978-0-7727-2540-0
55. *Indigenous-Municipal Legal and Governance Relationships*, by Doug Anderson and Alexandra Flynn, 2021. ISBN 978-0-7727-2542-4
56. *Development Charges and Housing Affordability: A False Dichotomy?* by Adam Found, 2021. ISBN 978-0-7727-2550-9
57. *Provincial-Local Equalization in Canada: Time for a Change?* by Richard M. Bird and Enid Slack, 2021. ISBN 978-0-7727-2554-7
58. *Evaluating Affordable Housing Outcomes in Toronto: An Analysis of Density Bonusing Agreements,* by Julie Mah, 2022. ISBN 978-0-7727-1112-0
59. *A Seat at the Table: Municipalities and Intergovernmental Relations in Canada,* by Tomas Hachard, 2022. ISBN 978-0-7727-1136-6
60. *A New Agenda for Local Democracy: Building Just, Inclusive, and Participatory Cities* by Brittany Andrew-Amofah, Alexandra Flynn, and Patricia Wood, 2022. ISBN 978-0-7727-1113-7
61. *Housing and Infrastructure Provision for Informal Settlements: Comparing Accra and Buenos Aires,* by Hsi-Chuan Wang, 2022. ISBN 978-0-7727-7365-4
62. *The Old and the New: A Tale of Two Local Property Taxes in Ireland,* by Gerard Turley, 2022. ISBN 978-0-7727-1142-7

ISBN 978-0-7727-7362-3
ISSN 1927-1921