THE BUSINESS OF CITY HALL

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Abstract

Though city governments are important providers of both public and private goods, little is known about their operations. This paper uses novel, hand-collected data on the 39 largest cities in the U.S. to shed light on their operations. I show that city governments are large and getting larger, with average revenues equivalent to the 78th percentile of U.S. publicly traded firms. Second, cities collect an increasingly large fraction of revenues through direct user fees, rather than taxes. Third, city expenses grow faster than population, but slower than personal income. This leads smaller, poorer cities' expenses to grow faster than their revenues.

Large cities play a predominant role in the national economy. Within the ten largest metropolitan areas of the United States, 26% of the country's total population lives on just 1.8% of the country's total land area, but generates 32% of the country's total GDP. These same ten metro areas account for 54% of total urban land value in the U.S. (Albouy, Ehrlich, and Shin, 2018). In addition, the predominance of large cities is growing. Since 2000, the population of these ten metro areas has grown at an annual rate that is 50% larger than the rest of the country (1.12% vs. 0.74%).

One of the key elements of a city's economic engine is its local municipal government. Research in urban economics shows that cities generate large economic output through agglomeration economies (Fujita and Thisse, 1996; Glaeser and Gottlieb, 2009). Cities provide essential infrastructure that supports the population density needed for agglomeration economies, such as roads, ports, and water treatment plants. City governments also indirectly influence private economic activity in numerous ways, including zoning regulations, building codes, and public-private real estate development projects. Finally, the local public goods literature suggests that if cities provide an attractive bundle of public goods and services at a competitive price, then cities will attract larger populations (Tiebout, 1956; Banzhaf and Walsh, 2008).

Though municipal governments play an integral role in the economic success of large cities, there is little systematic evidence on their operations. How large are city governments? What services do they provide? How do they fund their operations? The first goal of this paper is to provide answers to these basic questions about city governments. Rather than approaching city governments from the taxpayers point of view, as typically done (Glaeser, 1996; Heathcote, Storesletten, and Violante, 2017), this paper approaches city governments from the government's point of view, as holistic enterprises that provide both public and private goods supported by tax revenue, direct user fees, and grants. Understanding these basic facts about city governments is a crucial first step towards understanding the broader role of city governments as a provider of local public goods and as a catalyst for urban agglomeration.

The second goal of this paper is to quantify how population and personal income relate to city government finances. To frame the analysis, I appeal to the club model of Buchanan (1965) applied to municipalities as in Berglas (1976) and Hochman, Pines, and Thisse (1995). In the model, larger populations lower the cost per resident of providing public goods but also increase the congestion of

the good, reducing its benefit. In addition, cities with greater incomes demand more public goods. In equilibrium, the provision of a local public good is determined simultaneously by population and personal income to equate the marginal benefit of the public goods to their marginal costs. I use this theory to motivate the importance of population and income as determinants of city expenses, though I abstract from subsequent theoretical models on land rents (Stiglitz, 1977), competition among municipalities (Tiebout, 1956), or different revenue sources (Mieszkowski and Zodrow, 1989).

To find answers to these questions requires reliable data on city finances. Historically, cities have provided financial reports using opaque reporting standards on a fund-by-fund basis that prevented an analysis of the entire organization as a whole. Following mandated changes in governmental accounting standards in the early 2000s, cities are required to report government-wide financial statements using full accrual-based accounting, consistent with reporting standards for large public companies. However, these data are not collected in any publicly-available dataset, including the Annual Survey of the Census of Governments (ASCG) from the U.S. Census Bureau, which still includes segregated fund-by-fund reports using different accounting standards.

To overcome these limitations, I hand collect government-wide accounting statements from city government websites and through document requests. The result is a panel dataset of the complete income statement of the 39 most populous cities in the U.S. from 2003 to 2018. In 2010, these cities had a total population of 42.5 million people (14% of U.S. population) within their city boundaries, and are the primary government in 34 Metropolitan Statistical Areas, with a combined population of 127 million people, or 41% percent of the US population. To my knowledge, this is the most comprehensive dataset on city government operations using consistent accounting standards.

Towards the first goal of this paper, I exploit this new dataset to provide four main stylized facts about the operations of large cities. First, I find that large city populations and their residents' personal incomes rise considerably from 2003 to 2018. The population of the average large city grew by 16%, compared to 13% for the nation overall. Likewise, inflation-adjusted personal income per capita grew by 22%. Second, population growth is negatively correlated with population in 2003, while income growth is positively correlated with income in 2003. Thus, the population of larger cities grew slower than smaller cities and the incomes of wealthier cities grew faster than poorer

cities. Below, I show that the cross-section and time-series variation in population and income are important determinants of variation in city budgets.

Second, I find that the size of city governments is large and growing. In an average city-year, city governments spend $5.4 billion in 2018-inflation adjusted dollars ($2.4 billion at the median). To normalize these numbers, the average city spends $4,047 per resident per year, or 7.5% of the average resident's per capita income. To provide more context, the average city in the sample has revenues equivalent to the 78th percentile of U.S. publicly-traded corporations. In addition, 20 of the 39 cities have revenues that would rank them in the top five public corporations headquartered in the city. Inflation-adjusted city revenues have increased by 27% from 2003 to 2018 and per capita revenues have increased by 9%. However, city governments have grown slower than the personal income's of their residents. Expenses per dollar of income have decreased by 14% over the sample period.

Third, city governments provide a wide range of services, with the largest expenses for public safety at $1.2 billion per year, on average, or 25% of total expenses. The second largest expense is utilities at $755 million or 20% of total expenses. Primary education is provided by a separate authority than the city government in the majority of cities in the sample. Of the cities that do provide education, it is the largest expense. Other major functional areas of city governments are health services, general administration, public works, ports, culture and recreation, and economic development. Though total city budgets fluctuate over time, I find that each functional area's expenses as a fraction of the total city budget are highly persistent from 2003 to 2018, even though the period includes large changes in macroeconomic conditions.

Fourth, city governments collect revenues from two primary sources: taxes and charges for services. In the average city, taxes are dominated by property taxes (42% of total taxes), sales taxes (16%), and income taxes (16%). While academics and policy-makers focus on tax policy, cities actually receive a substantial portion of their revenues from non-tax sources. In particular, in an average city-year, 57% of expenses are covered by fees and grants. Excluding utilities operated by cities, 21% of expenses are covered by direct charges for services alone. Thus, even non-business-type activities of cities are supported by a substantial amount of direct user charges.

Towards the second goal of this paper, I study how population and income relate to the expenses and revenues of city governments. In the first set of tests, I show that cross-sectional variation in city expenses and revenues is explained more by variation in personal income than population. In between-effects models, using cities' time-series averages, a city that is 1% more populous than average has expenses that are about 1.1% above average. In contrast, a city that has 1% more income than the average city has expenses that are about 1.6% larger than the average city. This means that expenses per capita are statistically equal across cities of different sizes, holding income fixed, whereas expenses per capita are higher in cities with higher incomes.

One concern with cross-sectional analysis of cities is that omitted factors could vary across cities that affect city budgets, most notably price levels. Therefore, I run within-city regressions with city and year fixed effects. These regressions isolate the relationship between population, income, and city budgets, while holding constant time-invariant cross-sectional variation across cities, such as geography, governance, and price levels. I find that a 1% increase in a city's population is associated with an increase in revenues of 1%, but an increase in expenses of 1.8%, statistically larger than one. In contrast, a 1% increase in a city's personal income is associated with an increase in revenues of 1%, but an increase in expenses of 0.25%, statistically lower than 1%.

These results show that city expenses are more sensitive to population than income, while revenues are the opposite. Thus, cities with high population growth, but low income growth, such as Fort Worth and Charlotte, have a higher growth in city expenses than revenues. In contrast, cities like San Francisco and San Jose, that have high income growth and lower population growth experience higher growth in city revenues than expenses. Given the path dependence in city population and income, these results reveal that large, wealthy cities in 2003 enjoyed larger growth in city revenues, whereas smaller, less wealthy cities in 2003 experienced larger growth in expenses. It is important to note that my research design does not provide exogenous variation in population or income and these results cannot be used to infer causation. Additionally, the theoretical underpinnings predict that population and city expenses are simultaneously determined.

Finally, after controlling for city and year fixed effects, population, and income, I test for time-series changes in key government activities. I find that after controlling for these factors, the size of city budgets peaked in 2009 and declined in every following year. Public safety expenses increased

from 2003 to 2009, but reversed following the Great Recession to return to nearly the same level in 2018 as they were in 2003. In contrast, health care expenses declined substantially from 2006 to 2013, but by 2018, were at higher levels than 2003. On the revenues side, tax revenue fell from 2009 to 2012 and remained low, relative to 2003, through 2018. In contrast, charges for services increased from 2003 to 2010, and remained high, relative to 2003, through 2018.

The central contribution of this paper is to provide some of the first analysis of the enterprise-wide economics of large city governments in the U.S. In particular, the hand-collected data used in this paper provides some of the first accurate, government-wide look at city finances. Other papers also use these data to study how local governments respond to economic downturns (Ross, Yan, and Johnson, 2015; Rivenbark, Afonso, and Roenigk, 2018). By using government-wide data, this paper also provides new estimates of the fraction of total city expenses allocated to important functional areas, such as public safety, both in the cross-section and over time. Second, in contrast to existing work on municipal taxes (Forbes and Zampelli, 1989; Campbell, 2004), this paper shows that city governments generate a significant and growing fraction of revenue through direct user fees. This paper also helps understand how underlying population and income is related to the provision of local public goods, which has been shown to be an important determinant of income disparities across geographic space (Chetty, Hendren, Kline, and Saez, 2014; Chetty and Hendren, 2018).

I. Theoretical Framework

Buchanan (1965)'s club model of public goods provides a useful setting for framing the analysis of city governments. The model proposes that consumers face a trade-off between a private good and a public good provided by the club, subject to individual budget constraints. In the model as applied to cities, increasing population initially produces increasing marginal benefits from the public good, consistent with the large literature on agglomeration benefits in cities (Glaeser and Gottlieb, 2009; Behrens, Duranton, and Robert-Nicoud, 2014), but beyond a threshold, increased membership causes congestion of the public good, as observed in Ahn, Isaac, and Salmon (2009) and Duranton and Turner (2011). However, an increasing population always reduces the per member cost of producing the public good.

Given a budget constraint (proxied here by personal income), the optimal population and amount of public goods are simultaneously determined such that their marginal benefits are equal to their marginal costs. In particular, the addition of another member of the population further reduces the cost of producing the public good but also increases the congestion, and hence reduces the marginal benefit of the public good. In addition, when the population is small, an increase in income will lead to a larger increase in expenditures than if the population is large. If the population is large enough, an increase in income could lead to a reduction in expenditures because the benefits of the public good are substantially reduced by congestion, making the private good more preferable. Thus, the basic model of Buchanan (1965) shows that the amount of public goods produced depends on the size of the population and personal income.

In the original club model, the provision of the public goods is fully financed solely by a membership fee equally applied to all members. In the setting of a city, this is equivalent to a head tax. Further extensions of the model that allow for heterogeneity in the tastes of members or in the usage of members show that a flat membership fee is insufficient (Berglas, 1976; Scotchmer, 1985). Instead, a two-part pricing scheme, with a membership fee and a visitation fee, is proposed as a solution. In my empirical analysis, I will equate these two types of fees to the two major sources of city revenues: taxes and charges for services. Of course, taxes are not equally allocated across city residents. However, they are constant in relation to the quantity of the public good consumed by an individual, similar to a head tax.

The purpose of this paper is not to test the club model of cities. Instead, I rely on the club model simply to motivate the use of population and personal income as determinants of city expenditures. Thus, I abstract from a number of theoretical issues related to the provision of local public goods, including land rents (Hochman, Pines, and Thisse, 1995), anonymous congestion charges (Arnott and Kraus, 1998), and heterogeneous tastes (McGuire, 1974). Furthermore, just as the optimal governance of club models is typically ignored in theory because members are assumed to be identical, the governance of cities is beyond the scope of this paper. See Sandler and Tschirhart (1980, 1997) for overviews of the club model.

II. Data Sources

II.A. Comprehensive Annual Financial Reports for City Governments

To construct the sample, I start with the 40 most populous cities in the United States as of the 2010 census. For each city, I hand-collect Comprehensive Annual Financial Reports (CAFRs) from 2003 to 2018. CAFRs are annual financial statements published by local governments that comply with accounting standards set by the Governmental Accounting Standards Board (GASB). Most state and local governments are required by law to publish a CAFR and all 40 most populous cities publish CAFRs. I contacted cities directly to obtain CAFRs not posted on city websites. The sample starts in 2003 because that is when the GASB required CAFRs to present government-wide financial statements using full accrual-based accounting.

CAFRs divide city operations into three types of activities: governmental, business-type, and discrete component units. Though local governments have discretion over classifying operations into each type of activity, activities are usually grouped by the source of revenues. Governmental activities are typically funded by non-exchange revenues, such as grants and taxes, whereas business-type activities are typically funded by fees charged directly to users. A component unit is a legally separate organization from the city government, but still controlled by the city. Typical examples of component units are utility companies and housing authorities.

In this paper, I aggregate governmental, business-type, and component units into one entity. Because all three forms of enterprises are controlled by the same entity, this provides the most complete picture of government activities. In addition, combining the three types of operations eliminates intra-city transfers between departments that could distort the understanding of city finances. Similarly, aggregating into a single entity eliminates reclassification of an activity from one form of enterprise to another (e.g., reclassifying a utility from a component unit to a business-type activity).

The level of reporting detail in CAFRs varies across cities and over time. To provide consistent classifications, I aggregate city functions into 11 areas plus interest paid. The 11 functional areas are public safety, education, health, utilities, administration, public works, ports, culture and recreation, neighborhood, development, and miscellaneous. Similarly, I aggregate taxes into nine

different types: property, income, sales, business, entertainment, utility, shared, automobile, and miscellaneous tax. Panel A of Table I provides examples of city services that are classified into each of the 11 functional areas. Panel B provides examples of specific taxes for each of the nine types of taxes.

In addition to tax revenues, cities also collect revenues in the form of charges for services and grants. Charges for services is revenue generated by the direct user or recipient of the goods and services a government provides, such as building permit fees, parking citations, ambulance fees, and utility bills. Operating grants and contributions are revenues from other governments, organizations, or individuals that are restricted for the operations of a particular function. These revenues are typically from another government, such as county, state or federal. Capital grants and contributions are similar except they are restricted to purchases of capital assets.

II.B. Data Omissions and Final Sample

CAFRs sometimes present relevant data outside of the Statement of Activities. In particular, the statement of activities might only report the total tax revenues, but not revenues by individual tax types. In these cases, I use the notes to the financial statements in the CAFRs to identify the amounts of individual tax revenues. However, in the few cases where this is not possible, I drop the city-year observation entirely. Second, CAFRs from earlier years commonly present more aggregated information than later years (e.g., grouping automobile and entertainment taxes with miscellaneous taxes). When possible, I use later CAFRs to impute individual values from the aggregated values. In addition, I recode earlier data to reflect restated information from later CAFRs. The Internet Appendix provides details on these corrections for each city in the sample.

Based on the above limitations, I omit observations for Nashville from 2003 to 2007, Memphis from 2003 to 2007, and all years of Milwaukee. In addition, I drop Atlanta's 2006 observation because it changed its fiscal year-end date in this year. Finally, I was not able to obtain CAFRs for Portland, Oregon in years 2003, 2005–2007. After these omissions, the final sample includes 610 city-year observations.

II.C. Comparison of CAFRs with Census Data

Historically, public finance research has relied on the Annual Survey of the Census of Governments (ASCG) from the U.S. Census Bureau. However, ASCG data are not suited to a government-wide analysis because governments have the choice to use either modified accrual or full accrual basis accounting standards, even within a single city's census response. Full accrual accounting, as used by public companies, tracks transactions when they occur, rather than cash flows. Modified accrual accounting records expenses on a full accrual basis, but records revenues on a cash basis. Without further information, modified and full accrual accounting cannot be reconciled (Wallace, 2000). In addition, Census responses are not audited by independent accountants.

In contrast, since the GASB issued Statement No. 34 in 1999, CAFRs are required to include audited, government-wide financial statements using full accrual-basis accounting. In addition, GASB No. 34 requires governments to report a net-cost presentation by functional area in their CAFRs, in contrast to the aggregated data in the Census. The net-cost analysis matches revenues and expenses within each functional area to identify which functional areas are funded by general revenues versus fees and restricted grants.

II.D. Additional Data Sources

Throughout the paper, I present city finances in three ways: inflation-adjusted, per capita, and per dollar of personal income. First, all dollar values in the paper are adjusted for inflation to 2018 dollars using city-specific Consumer Price Indices (CPI) for Urban Consumers provided by the Bureau of Labor Statistics (BLS). If the BLS does not report CPI data specific to one of the 39 sample cities, I use either the CPI for the MSA of the city (e.g., Los Angeles CPI data for Long Beach), or CPI Region data (e.g., West CPI data for Portland). Second, per capita values are normalized using estimated population data from the U.S. Census Bureau. Finally, per capita personal income data are from the Bureau of Economic Analysis. Personal income is the sum of wages and salaries, supplements to wages and salaries, proprietors' income, dividends, interest, and rent, and personal current transfer receipts, less contributions for government social insurance (Bureau of Economic Analysis, 2019).

Inflation-adjusted dollar amounts control for price levels within a city's time-series. There is no standard method to adjust for cost of living differences across cities (Handbury and Weinstein, 2015). Therefore, I use two alternative approaches to control for variation in price levels across cities. First, I normalize expenses and revenues by personal income and also by controlling for personal income in regressions. Second, I include city fixed effects in regressions which absorb cross-city differences in price levels.

III. Constituencies of Large U.S. Cities

Figure I presents a map of the 40 largest cities in the U.S. The cities are spread across 26 states, though seven of the cities are located in California, five in Texas, and two in Tennessee. A number of the cities represent individual municipalities within the same urban clusters, such as San Francisco and San Jose, or Phoenix and Mesa.[1]

Table II presents a list of the 39 cities in the sample, ordered by population in 2010. The largest city is New York City with an average population of 8.2 million over 2003 to 2018. Los Angeles and Chicago are the next most populous cities. Dallas and San Jose have populations closest to the average population of 1.1 million. The median city in the sample is El Paso, with a population of 646,000. The least populous cities are Virginia Beach, and Atlanta, with an average population of about 440,000. Atlanta's small population highlights the difference between cities and Metropolitan Statistical Areas (MSAs). Of the sample cities, Atlanta is part of the eighth largest MSA, but is the 39th largest city. In contrast, Jacksonville, Florida is the 11th largest city, but part of the 28th largest MSA.

Next, Table II reports the average inflation-adjusted personal income per city during 2003 to 2018. The average person in the average city has a personal income of $52,000. The average person in the median city has an income of $49,000. The average personal income across all 39 cities (i.e., the population weighted average income) is $54,700, considerably higher than the national average of $48,600. San Francisco has the highest average personal income per capita ($103,200) and El Paso ($32,000) has the lowest. The correlation between average population and per capita income is 18%, consistent with Glaeser and Gottlieb (2009).

[1]As stated above, data limitations cause me to drop Milwaukee from the sample.

Figure II presents the time series of population and personal income. The population growth in the average city from 2003 to 2018 is 16.0%, compared to 12.7% for the nation overall. There is large variation in population growth across cities. At one extreme, Fort Worth's population grew from 602,000 in 2003 to 895,000 in 2018, a 48% increase. Charlotte and Austin also had population growths of roughly 40%. At the other extreme, Detroit's population fell from 884,000 to 673,000, a 24% decrease. Memphis, Chicago, and Baltimore had population decreases of roughly 4% over this period.

Panels C and D of Figure II show that inflation-adjusted personal income increased in every year except 2008, 2009, and 2013. From 2003 to 2018, personal income in the average large city increased by 22%, from \$47,343 to \$58,400, identical to the growth rate of personal income for the country. As with population growth, income growth exhibits wide variation across cities. Large, coastal cities dominate the high end of the spectrum, including San Francisco (58%), Philadelphia (43%), and Boston (37%). At the other end of the spectrum, smaller cities in the south and southwest experienced smaller income growth: Las Vegas (3.7%), Albuquerque (4.6%), and Memphis (5.2%).

Smaller cities grew faster than bigger cities, but wealthier cities' income increased faster than poorer cities' income. The correlation between population in 2003 and population growth from 2003 to 2018 is -26%. In contrast, the correlation between income in 2003 and income growth is 61%. Figure III presents a connected scatter plot of population growth against income growth for four groupings of cities from 2003 to 2018. The groupings are based on median city population and income in 2003. Large cities with high personal income, such as New York and Los Angeles, experienced the lowest population growth (10%), but the highest growth in personal income (26%). Small cities with low personal income, such as Mesa and Virginia Beach, experienced larger population growth (14%), and low growth in income (14%). Small cities with high incomes, such as Boston and Seattle, also experienced large population growth (18%), but also higher growth in personal income (19%).

These data show that the population size of large US cities has been converging, while personal income has been diverging. These facts will play an important role in understanding city budgets, as discussed later in the paper.

IV. A Profile of Expenses and Revenues of Large City Governments

IV.A. The Size of City Governments

Table II reports that the average total expense per city is $5.4 billion per year; the median city is Dallas with $2.4 billion in expenses. New York City has the highest average expenses per year ($78.4 billion), followed by Los Angeles ($13.4 billion), and Philadelphia ($13.0 billion). The cities with the smallest expenses are El Paso ($880 million), Las Vegas ($873 million), and Fresno ($695 million). Thus, New York City's annual expenses are 32 times the median city's expenses and over 100 times as big as the 39th city's expenses.

Next, Table II reports that the average city in an average year has $5.5 billion in revenues, for a positive change in its net position of $49 million, while the median city has revenues of $2.4 billion, for a positive net change in its position of $98 million. The average city's change in net position is 0.9% of its total revenues; for the median city its change in net position is 0.4% of its total revenues. At the extremes, New York City's revenues of $75.8 billion are $2.6 billion less than its expenses, representing about 3.5% of total revenues. For context, this means that New York City's average deficit is larger than the total expenses of the median city. In contrast, Los Angeles's revenues of $14.5 billion generate an average increase in its net position of $1.1 billion per year, or 7.5% of total revenues.

The average city has $4,047 in expenses per capita, and the median city has $3,250. Average per capita revenues are $4,232, and median per capita revenues are $3,149. Thus per person, the average city collects $186 more in revenues than its spends. The highest per capita expenses are in Washington D.C. ($18,950) and San Francisco ($10,500). In contrast, Las Vegas, Fresno, and El Paso, all have expenses that are less than $1,500 per person.

Finally, Table II shows that for each dollar in personal income, the average city collects 7.9 cents in revenue and spends 7.5 cents on expenses. The median city has slightly lower rates at 6.2 for revenue to income and 6.5 for expenses to income. Large East Coast cities have the highest revenues per income, including Washington D.C. (30%), Philadelphia (17%), and New York (14%). In contrast, Indianapolis collects only 2.7 cents and San Jose collects 2.8 cents per dollar of personal income.

To provide further context for the size of city governments, Figure IV compares the size of city revenues to publicly-traded corporations. The red line in the figure presents the probability density estimate of the log revenues of publicly traded firms headquartered in the U.S. in 2018. Corporate revenues are centered around $1 billion in revenues. The blue bars in the figure represent the frequency distribution of the 39 cities in my sample. City revenues follow a similar distribution as the right tail of the corporate revenues, though centered around $1.75 billion. The average city in the sample has revenues equivalent to the 78th percentile of the revenues of U.S. publicly-traded firms. The revenues of the top six cities are above the 90th percentile of corporate revenues. Fresno, the city with the smallest revenues is equivalent to the 58th percentile of corporate revenues.

Finally, I compare city revenues to the revenues of firms headquartered in the same city. In 2018, twenty out of the 39 cities in the sample had revenues that would rank them in the top five companies by revenues. For example, from 2003 to 2014, the revenues of the City of Los Angeles were larger than the revenues of all of the roughly 55 public companies headquartered in Los Angeles. Likewise, in an average year, New York City's revenues are equal to the 98th percentile of the revenues of the nearly 300 publicly-traded firms headquartered in the city. To illustrate, the size of Atlanta's revenues is closest to Equifax, one of the top three credit bureaus; Baltimore is closest to T. Rowe Price, one of the top five mutual fund managers; Denver is closest to Molson-Coors, the second largest brewer in the U.S.; San Francisco is closest to Visa, the leading credit card payment network; and New York's revenues are closest to some of the largest financial services firms in the world, including Goldman Sachs, Morgan Stanley, and Citigroup.

Figure V presents the time series of total city revenues and expenses for the average and median cities in inflation-adjusted dollars, per capita inflation-adjusted dollars, and per dollar of income. Panel A shows that the average city's total expenses and revenues have increased considerably faster than inflation from 2003 to 2018. Revenues increased from $4.89 billion in 2003 to $6.20 billion in 2018, a 27% increase. Expenses increased from $4.92 billion in 2003 to $6.04 billion in 2018, a 23% percent increase. Revenues are larger than expenses in all years except those around the financial crisis, when average city expenses spiked.

Even though city populations have increased considerably since 2003, Panels C and D show that from 2003 to 2018, the size of city governments increased faster than population growth. Controlling

for inflation, per capita revenues increased by 8.8%, while expenses per capita increased by 5.9%, with significant declines following the Great Recession in 2009. Revenues per capita in the median city have increased by 34% from $2,762 in 2003 to $3,707. Expenses per capita in the median city rose by 18%. Chicago and New York's revenues per capita increased by more than 40% during this period. In contrast, Detroit, Nashville, and Memphis saw declines of 41%, 38%, and 28%.

In contrast to the increase in per capita city size, Panel E shows that average city revenue per dollar of personal income declined by 12%, from 8.1% in 2003 to 7.1% in 2018. Expenses per income decreased by 14% over the same period. Thus, personal income has grown faster than the size of city budgets. While the size of cities per income has declined on average, Chicago's revenue per income grew by 14%, followed by Houston (7%). In contrast, revenues per income declined substantially in Nashville (−50%), Detroit (−50%), and Sacramento (−35%).

IV.B. City Functional Areas

This section describes how cities allocate expenditures. For each of the 11 functional areas, Table III presents expenses and revenue sources in inflation adjusted dollars.[2] The largest expense of the average city is public safety, accounting for 25% of total city expenses. Public safety includes police, fire, jails, and animal control departments. Using observations from cities with disaggregated data on sub-functions, police account for about 60%, fire for 28%, and jails for 11%. On average, cities spend $1.18 billion, or $838 per person, on public safety. The median city spends $539 million in total, or $705 per person per year. Public safety expenses are covered primarily through general revenues, as charges for services are small ($64 per capita per year), as are grants ($60 per capita), leaving an aggregate of about $1 billion, on average, and $480 million at the median, to be funded by general revenues. Thus, though public safety represents 25% of expenses, it represents 60% of net expenses that are funded by general revenues. In terms of an income tax equivalent, public safety costs 1.4% per dollar of income in unfunded expenses.

For the average city, the next largest expense is education at $1 billion, or $520 per capita. However, the median city has no education expenses. Only 10 cities out of the sample of 39 have education expenses greater than 1% of total expenses. In the remaining 29 cities, public education

[2]Internet Appendix Table Table I provides summary statistics on all city budget items. Internet Appendix Tables II-IV presents the same information in per capita, per income, and per total terms.

is provided by an independent authority. Thus, for cities that fund eduction, it is the largest expense of all functional areas. For example, education is 56% of total expenses in Virginia Beach, 44% of expenses in Boston, and 40% of expenses in Baltimore. While charges for services are small, education receives large operating grants, typically from the state government. This reduces the net expense, and hence education represents only 8% of total net expenses for the average city.

Health expenses are the next largest expense for the average city at $795 million on average ($65.7 million at the median), or $445 per capita on average ($94 at the median). Like education, health services receive large operating grants. Thus, for the average city, health expenses account for 5.5% of total expenses, but receive 17% of total operating grants. Finally, general administration costs of city government are $444 million on average ($154 million at the median), or $322 per capita ($203 at the median). This represents about 8% of total expenses, 8% of charges for services, and 11% of net expenses. These costs can be regarded as the overhead costs of running a city government, including courts, judicial services, legislative bodies, and finance and budgeting departments.

Figure VI plots the time-series of the average expenses on public safety, health, and administration. In absolute terms, public safety expenses have increased significantly from 2003 to 2018 (39% on average, 41% at the median). For comparison, average health services have increased by 6% and administration expenses have increased by 37%. On average, per capita expenses on public safety have also increased from $745 in 2003 to $860 in 2018, a 15% increase. In comparison, per capita health spending has decreased by 3% from $468 to $451 and administration has increased by 14% from $302 to $343 per capita.

Though these statistics suggest that average city budgets have changed significantly from 2003 to 2018, normalizing by total expenditures reveals that budget allocations are much less volatile. Panel D of Figure VI shows that public safety, health, and administration expenses as a fraction of total expenses are highly persistent. Public safety expenditures have increased from 23.6% in 2003 to 25.4% in 2018. Administration expenses have increased from 8.1% in 2003 to 8.5% in 2018. Given that the period 2003 to 2018 includes both boom and bust years, these results suggest that cities allocate a fixed fraction of total resources across city functions, regardless of major changes in the economy.

The next largest city expenses come from a set of functional areas with large infrastructure components: utilities, public works, and ports. Table III provides the expenses and revenues for these functions. Utilities and ports operate as business-type activities, collecting large charges for services. In particular, utilities have $755 million in expenses in the average city year, but collect $719 million in fees, roughly 50% of the total charges for services received by the average city. After accounting for grants, utilities provide a small net revenue of $2.7 million on average, and $37 million at the median. Ports are similar, collecting $199 million in charges to cover expenses of $208 million, on average. After including grants, ports generate positive revenues of $25 million on average, and break even at the median. In per capita terms, utilities generate $64 per person and ports generate $31 per person in net revenue, on average. Public works also generate large charges for services that cover almost a third of total expenses.

Figure VII shows that the absolute amount of utility expenses have increased by 32% from $610 million in 2003 to $808 million in 2018. Similarly, port expenses have increased by 39%. In contrast, expenses on public works increased by only 4%. Controlling for population, utility expenses have risen by 16%, ports by 12%, and public works have not changed. Controlling for personal income leads to a decreasing trend for utility expenses, while public works and ports remain relatively flat. As above, Panel D of Figure VII shows that the fractions of total expenses allocated to these functions has changed little from 2003 to 2018.

The remaining functional areas, including culture and recreation, neighborhood services, and development services, each constitute about 5% or less of total expenses. However, because culture and recreation receives relatively little charges or grants, it constitutes more than 10% of the net expenses that must be funded by general revenues.

Unreported partial correlations show that spending is correlated across functional areas in the cross-section of cities. Cities that spend a larger fraction of expenses on public safety spend a smaller fraction on health, utilities, and ports, but a larger fraction on culture and recreation. Cities that spend a larger fraction of total expenses on health spend a smaller fraction on utilities and administration. Within a city's time-series, when public safety expenses increase as a fraction of the total, all other functions decrease with the most negative correlation with neighborhood and development expenses and the least negative correlations with health and culture. When

health expenses increase, administration and utility expenses decline, while culture and public works increase. These results imply that public safety, neighborhood, and development expenses are substitutable to some degree. In contrast, health, public works, and culture are complements.

IV.C. Revenue Sources

Table III shows that large city governments cover a substantial portion of their expenses with direct fees charged to consumers and with grants and contributions that are restricted to a particular function. In the average city-year, cities cover 57% of their expenses with charges for services and grants. Excluding grants, 36% of total expenses are covered by direct charges and fees in the average city-year. In the median city-year, 45% of total expenses are covered by charges for services and grants; 32% are covered just by charges for services. Excluding utilities, the average city covers 45% of its expenses with charges for services and grants. Excluding grants, 21% of total non-utility expenses are covered by direct charges for services. For the median city, 32% of non-utility expenses are covered by fees and grants, or 18% by service fees alone.

Figure VIII presents the time series of the two major sources of city revenues: taxes and charges for services. First, in absolute terms, tax revenue is considerably higher than charges for services in the average city. In 2018, tax revenue is $3 billion, 1.8 times larger than fee revenue of $1.6 billion. In contrast, in the median city, tax revenue and fee revenue are roughly equivalent ($980 million vs. $990 million). Second, tax revenue in the average city increased substantially from $2 billion in 2003 to $3 billion in 2018, an increase of 47%, while charges for services increased by 32%. In the median city, taxes increased by 28%, while fee revenue increased by 44%.

Controlling for population growth in Panels C and D shows that fee revenue per capita in the average city has been flat since 2007, though tax revenue is more volatile and has increased significantly since 2012. In contrast, in the median city, tax revenue per capita is roughly constant over the entire sample period (8% growth), but fee revenue increases by 27% from $800 in 2003 to $1,011 in 2018. Controlling for income growth in Panels E and F reveals that in the average city, tax revenue per dollar of income has remained relatively constant between 3.10% and 2.95%, with a decrease in 2010-2012. In contrast, fee revenue decreased 17% from its peak in 2009. In contrast,

the median city's fee revenues per personal income have increased and tax revenue has decreased, such that the two are are nearly identical since 2011.

The above results show that though the average city covers more than half of its expenses with direct charges for services and grants, 43% of its expenses need to be covered with general revenue, most importantly, taxes. Cities use a wide variety of taxes to fund cover these expenses. Table IV presents the general revenues of the average and median cities. The average city raises $2.5 billion in taxes, which is equivalent to about $1,650 per person, or 3% of personal income. The median city raises $873 million in taxes, or about $1,025 per person and 2% of personal income. Taxes represents about 85% of general revenues. The remainder of general revenues is in the form of general-use grants (5%), investment income (3%), intergovernmental transfers (3%), and miscellaneous items.

Total taxes of the average city are comprised of property tax (42%), income tax (16%), sales tax (16%), business tax (5%), and lesser taxes, including taxes on entertainment, utilities, taxes shared with the state, automobile taxes, and others. In contrast, the median city relies more heavily on property and sales taxes, and has no income tax, utility tax, shared tax, or automobile tax. This suggests that larger cities collect a wider variety of taxes than smaller cities.

V. The Relationship Between City Revenues, Expenses, Income, and Population

In this section of the paper, I test the relationship between a city's expenses and revenues with its population, and the personal income of its residents. It is useful to understand these relationships both across cities, using cross-sectional variation, as well as within cities' time-series, holding time-invariant cross-sectional variation fixed.

V.A. Econometric Model

To understand the underlying patterns in the data, I estimate variations on the following model using both between-effects and fixed-effects estimators.

$$\log(\textit{City budget item})_{ct} = \beta_e \log(\textit{Population}_{ct}) + \gamma_e \log(\textit{Income per capita}_{ct}) + \tau_t + \nu_c + \epsilon_{ct}, \quad (1)$$

where *City budget item*$_{ct}$ represents city c's expense or revenue in year t, τ_t are year fixed effects, and ν_c are city fixed effects. The e subscript on the coefficients represents elasticity because the coefficients in a log-log model are estimates of elasticity.

The between-effects estimates of Equation 1 are equivalent to estimates from regressions on the time-series averages for each city. Thus, the year and city fixed effects are irrelevant as within-city variation is removed, leaving only variation across cities. While the between-effects estimates isolate cross-city variation, one concern with this approach is that other omitted variables that are correlated with population and per capita income confound their estimated marginal effects on city budgets. For instance, price level differences across cities is likely to be highly correlated with per capita income. This means that the marginal effect of income on city expenses, for example, may reflect, in part, simply variation in price levels.

The fixed-effects estimates help address omitted cross-sectional variables, but do not reflect variation across cities. Instead, the fixed effects estimates normalize the variables by time-invariant traits of the city, such as geography, governance, and price levels, and isolate the variation that occurs within the average city's time-series. The fixed effects estimates also include year fixed effects which normalize common variation across cities per year.

It is important to note that none of these estimates can be interpreted as causal evidence that population and income affect city budgets. Causal inference requires exogenous variation in population and income. In fact, changes in population and income are potentially caused by changes in city expenses and revenues. The Tiebout model predicts people move to a city based on the package of public goods and taxes offered by a city. Likewise, population size and expenses on public goods are jointly determined in the club model of Buchanan. Instead, these estimates help to quantify the magnitude of the correlation between cross-sectional and within-city variation in income and population with city government budgets.

I estimate three variations on the dependent variable, consistent with the prior results of the paper: logged values, per capita values, and per income values. As mentioned above, when the dependent variable is in logged values, the coefficient estimates on log(population) and log(income) reflect elasticities. For example, coefficient estimates equal to 1.0 imply that a 1% increase in population is associated with a 1% increase in the dependent variable.

When the dependent variable is in per capita terms, the equation is as follows:

$$\frac{\textit{City budget item}_{ct}}{\textit{Population}_{ct}} = \beta_p \log(\textit{Population}_{ct}) + \gamma_p \log(\textit{Income per capita}_{ct}) + \tau_t + \nu_c + \epsilon_{ct}, \quad (2)$$

where the subscript p denotes per capita effects. The magnitude of the effect is the coefficient estimate divided by 100 in per capita units of the dependent variable. Because I normalize the dependent variable by a transformation of one of the independent variables, the coefficients in Equation 1 and Equation 2 are mechanically related. In particular, $\beta_p = (\beta_e - 1) \times \frac{\text{Dependent variable}}{\text{Population}}$. For example, in a regression on expenses, β_p equals the elasticity of expenses to income minus one, scaled by expenses per capita. Thus, $\beta_e > 1$ corresponds to $\beta_p > 0$. This implies that if the elasticity of expenses to population is greater than one ($\beta_e > 1$), then a 1% increase in population leads to a greater than 1% increase in expenses, corresponding to expenses per capita increasing with population ($\beta_p > 0$). Next, $\gamma_p = \gamma_e \times \frac{\text{Dependent variable}}{\text{Population}}$. In the case that the dependent variable is expenses per capita, γ_p is the elasticity of expenses to income scaled by per capita expenses.

When the dependent variables is in per income values, the equation is:

$$\frac{\textit{City budget item}_{ct}}{\textit{Income per capita}_{ct}} = \beta_i \log(\textit{Population}_{ct}) + \gamma_i \log(\textit{Income per capita}_{ct}) + \tau_t + \nu_c + \epsilon_{ct}, \quad (3)$$

where the subscript i denotes per income effects. The relationships between β_i and β_e and γ_i and γ_e are analogous to coefficients in Equation 2. In particular, $\gamma_i = (\gamma_e - 1) \times \frac{\text{Dependent variable}}{\text{Income}}$ and $\beta_i = \beta_e \times \frac{\text{Dependent variable}}{\text{Income}}$.

V.B. The Determinants of Total Expenses and Revenues

Table V presents estimates of the regressions in Equations 1-3. In Panel A, the dependent variable is a transformation of total city expenses. In Panel B, the dependent variable is a transformation of total city revenues. The first three columns presents between-effects regression models and the last three columns present fixed-effects regression models, including year dummies, not reported. In log-log specifications, asterisks indicate coefficient estimates that are statistical different than zero. The letters *a*, *b*, and *c* indicate that coefficients are statistical different than unity at levels 0.10, 0.05, and 0.01. A log-log coefficient without any asterisks or letters indicates the coefficient cannot be statistically distinguished from zero or one.

First, between cities, a city with a population that is 1% larger than average has expenses and revenues that are about 1.1% larger than average. These coefficients are statistically different than zero, but statistically equal to one. A city with personal income that is 1% larger than average has expenses and revenues that are about 1.6% larger than average, statistically larger than one. These estimates show that variation in expenses and revenues across cities is more sensitive to income than population. This means that holding income fixed, a city with a population that is 1% larger than another city is expected to have a city budget that is 1% larger. However, holding population fixed, a city with an income that is 1% larger than another city is expected to have a city budget that is 1.6% larger.

In column two, Table V shows that holding income fixed, cities with larger populations have equal expenses per capita as cities with smaller populations. This is consistent with an elasticity of expenses with respect to population equal to one. However, holding population fixed, cities with greater income have higher expenses per capita. Column 3 shows that personal income is not significantly related to variation across cities' expenses, consistent with an income elasticity of expenses equal to one. Panel B shows that across cities, revenues have a nearly identical relationship with population and income as do expenses. In particular, variation in total revenues across cities is more sensitive to variation in personal income than population.

The last three columns of Table V present the within estimates, holding time-invariant traits of the cities fixed and controlling for year dummies. Controlling for omitted factors, the population elasticity of expenses is 1.8, which is statistically higher than one. This is reflected in the large point estimate on the relationship between population and per capita expenses, though the coefficient is not statistically different than zero. In contrast, the income elasticity of expenses is 0.25, which is statistically less than one. This is reflected in the negative coefficient on the per income expenses which implies that cities with higher incomes spend less per dollar of income than cities with lower incomes. Thus, within a city's time series, city government expenses increase at a faster rate than population growth, but city expenses increase at a slower rate than personal income increases.

Within-city variation in revenues is different than variation in expenses. In particular, the population and income elasticities of revenues are both equal to one. Thus, the average city

collects the same revenues per person, regardless of the size of population, controlling for income. Similarly, revenues per dollar of income remain constant as income increases.

Putting these results together, the fixed effects models show that a 1% increase in population is associated with an increase in revenues of 1%, but an increase in expenses of greater than 1%. In contrast, a 1% increase in personal income is associated with an increase in city revenues of 1%, but an increase in city expenses of less than 1%. Thus, cities where population growth is high, but income growth is low will see expenses grow faster than revenues. In contrast, cities with low population growth, but high income growth will see revenues grow faster than expenses. Figure IX presents evidence consistent with this prediction. On the horizontal axis is the growth rate of a city's personal income from 2003 to 2018 minus the growth rate of its population. On the vertical axis is the growth rate in city revenues minus the growth rate in city expenses. The figure reveals a strong positive relationship between these two variables. Cities that have higher growth in income than population, like San Francisco and San Jose, tend to have higher growth in city revenues than city expenses. On the opposite extreme, Fort Worth and Charlotte have higher population growth than income growth and also higher growth in city expenses than revenues.

Given the path dependency of city population and income growth demonstrated in Figure III, the growth rate of city revenues and city expenses are also likely to have path dependence. We can observe this in Figure IX. Large cities with high incomes in 2003, such as New York, Los Angeles, Chicago, and San Francisco, had high income growth but relatively low population growth from 2003 to 2018. These same cities also had larger growth in city revenues than expenses. In contrast, small cities with low income in 2003, such as Albuquerque, Mesa, and Louisville experienced relatively high population growth but low income growth. These cities also experience larger growth in expenses than revenues.

V.C. The Determinants of Functional Expenses

The above results show that across cities, city expenditures are more sensitive to income than population. In Table VI, I run identical tests as before using the expenses of each functional unit as dependent variables. The largest functional area, public safety, has population and income elasticities both equal to 1.1. Thus, across cities, public safety expenditures rise in direct proportion

to population and income. In contrast, the elasticities of health spending are not significantly different than zero, though the point estimates are large, with higher elasticity on income. Using expenses per income as the dependent variable shows that cities with higher incomes spend more on health per dollar of income than do cities with lower incomes. Administration expenses also have elasticities of one with respect to income and population, with higher sensitivity on income.

The city functions with large infrastructure components display a different pattern. Utilities and ports both have positive population elasticity of expenses, but negative point estimates of the income elasticity of expenses. In particular, though the coefficient on log(income) is not statistically different than zero, it is statistically less than one. This means that cities with higher incomes spend less per dollar of income on utilities. This is reasonable because the demand for utilities is expected to have a low elasticity with respect to income. Finally, public works has a large point estimate of income elasticity, and significant coefficient when the dependent variable is expenses per income. Thus, like health expenses, higher income cities spend more per dollar on public works than do lower income cities.

Table VII presents within-effects models controlling for city and year fixed effects. These results help to identify which city functions drive the high population elasticity and low income elasticity of expenses. The results show that public safety expenses have a population elasticity of 1, but an income elasticity of 0.4, statistically less than one. Likewise, administration expenses have a population elasticity of 1.5, but income elasticity statistically equal to zero. Public works expenses are also highly sensitive to population, but not income. Thus, as a city becomes wealthier, holding its population fixed, the per income spending on public safety, health, public works, culture and recreation, and neighborhood services decline. In contrast, as a city's population grows, holding its income fixed, spending per person increases for health, public works, and development.

These results show that the high population elasticity and low income elasticity of total city expenses are driven by high population elasticity of public works and administration expenses and low income elasticity of public safety, health, public works, culture, and neighborhoods.

V.D. The Determinants of City Revenues

The results presented so far show that across cities, the income elasticity of revenues is higher than the population elasticity. Table VIII presents estimates of the between-effect model of different forms of city revenues. These results show that taxation, particularly property taxes, drive this result with an income elasticity of 1.8, significantly larger than one. Thus, in cities with higher incomes, property taxes, as a fraction of income are higher than in cities with lower incomes. Though not statistically significant, the point estimate on the population elasticity of income taxes is large, while the income elasticity is low. This means that larger cities tend to collect more income tax per person, controlling for income levels. In contrast, charges for services has equal elasticity with respect to income and population. Finally, the level of operating grants across cities is more sensitive to income differences than population differences, while capital grants have a population elasticity significantly smaller than one. This means that larger cities receive smaller capital grants per capita than do smaller cities.

Table IX presents estimates of the within-city fixed effects regressions. The results show that the population elasticity of total taxes, and of property taxes is 1.8, significantly larger than one. However, the population elasticity of income taxes is 0.15, significantly less than one. In contrast, the population elasticity of charges for services is 0.8, statistically equal to one. These result imply that when a city's population increase by 1%, total taxes and property taxes increase by 1.8%, though income taxes only increase by 0.15, and service charges increase by 0.8. In response to a 1% increases in income, total taxes increase by 0.8, though property taxes are unchanged and income taxes respond by 0.1, significantly less than one. Charges for services are unrelated to income changes. Finally, operating grants are positively related to population, while capital grants are related to income.

In comparison to expenses, these results show that tax revenues and charges for services are positively related to population and income. Taxes are more sensitive than charges for services.

V.E. Time-Series of City Revenues and Expenses

The within-city models estimated above include untabulated year dummies. Figure X presents the point estimates of these year effects for the tests. Population, income, and city fixed effects

explain much of the variation in revenues and expenses, so the point estimates are not always statistically significant. However, the point estimates present general trends in city revenues and expenses.

First, Panel A show that revenues and expenses declined following the Great Recession through the end of the sample. Thus, relative to population and income, the average city's budget has decreased from its peak in 2009. Panel B shows that public safety expenses increased from 2003 to 2009, but by 2018, they were nearly the same as in 2003. Health care cost declined substantially from 2006 to 2013, but by 2018 were at higher levels than in 2003. Administration costs also declined during the Great Recession. These results show that though expenses overall declined during the Great Recession, the change in expenses varied by functional areas.

Panel C and D show the four main forms of revenues over time. Panel C shows cities' increasing reliance on charges for services and their decreasing reliance on tax revenues. Between 2009 and 2012, tax revenues fell every year and then were stable from 2012 to 2018. In contrast charges for services increased from 2003 to 2010, and then remained stable from 2012 to 2018. Panel D shows that both operating and capital grants fell substantially from 2009 and 2010. This reflects a trend that local governments receive less assistance from Federal resources.

VI. Conclusion

Based on either their sheer scale or the myriad services provided by city governments, such as policing, public roadways, and water services, city governments influence the daily lives of millions of people. Using newly assembled data that overcomes the opaqueness and inconsistency of prior data sources, this paper presents new stylized facts about the expenses and revenues of the governments of the 39 largest US cities from 2003 to 2018. First, these governments are large, with average revenues equal to the 78th percentile of publicly-traded revenues. Revenues grow faster than inflation and population growth, but slower than the personal income growth of the people who live in the cities. Second, though taxes are the primary source of revenue, direct user fees paid to city governments account for a significant and growing fraction of city revenue. Third, cities allocate resources primarily to public safety, utilities, and health services. The fraction of total

expenses allocated to each of these functions is highly persistent over the entire 16 year sample period.

The paper then relates the elasticity of city revenues and expenses to population and personal income. The elasticity of expenses to population is greater than one, but the elasticity of expenses to income is less than one. In contrast, the elasticity of revenues to population and income is statistically equivalent to one. Given these elasticities, the paper shows that cities with higher population growth than income growth experience faster growth in city expenses than revenues. In contrast, cities with higher growth in income than population experience faster growth in city revenues than expenses. At the same time, the paper shows that the population of large cities grows slower than small cities, but the personal income per capita of wealthier cities grows faster than than poorer cities. Therefore, cities that were larger and wealthier in 2003, such as San Francisco, had faster growth in city revenues than expenses. In contrast, smaller and poorer cities in 2003, such as Fort Worth, had higher growth in city expenses than revenues.

The basic facts presented in this paper lay a foundation for addressing many important, but unanswered questions. How do cities finance their long-term investments? How do political systems of governance influence cities' economic operations? Why do some large cities have jurisdiction over education, but most do not? Why do some cities rely more on direct user fees than others? Answers to these and other questions will help explain the overarching question of what is the role of the city in society?

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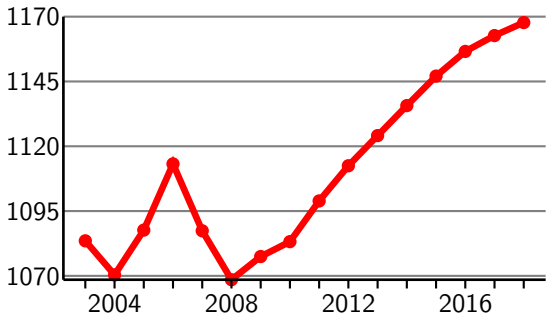
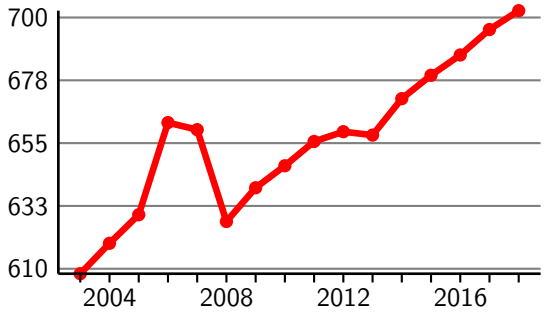
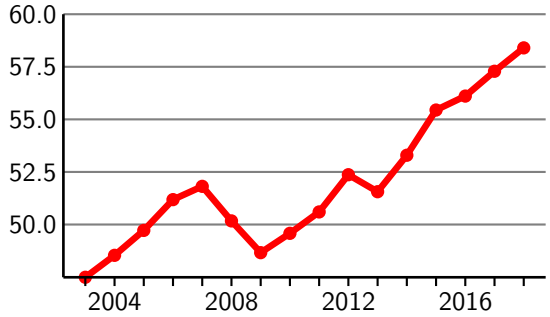
FIGURE I
LARGEST 40 U.S. CITIES BY POPULATION
Note: Milwaukee is dropped from the sample because its financial data is incomplete.



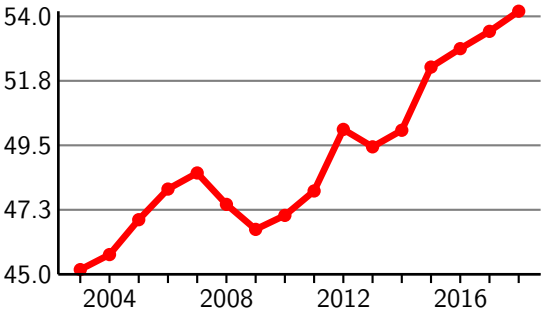
(A) Population (1000s)
Average City



(B) Population (1000s)
Median City



(C) Personal income ($1000s)
Average City



(D) Personal income ($1000s)
Median City

FIGURE II
Population and Personal Income
Personal income is income from all sources in 2018 inflation-adjusted dollars.

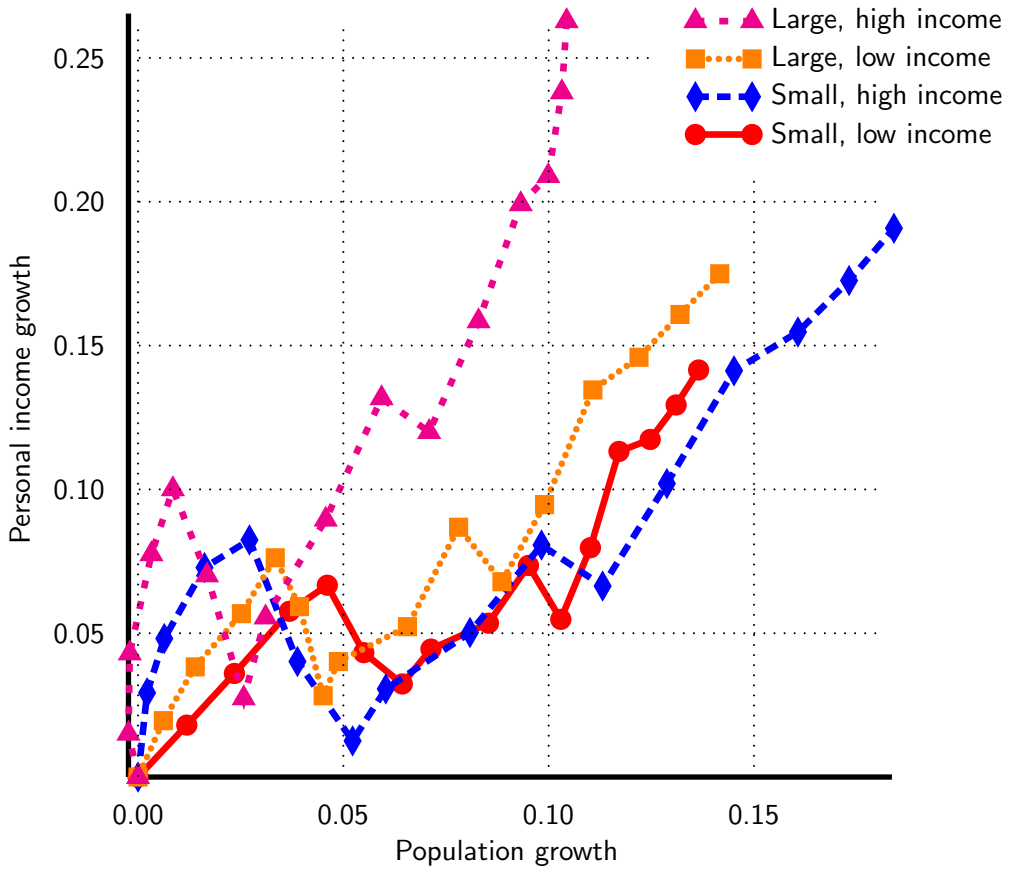


FIGURE III

Population and Income Growth 2003–2018 Based on Population and Income in 2003

Cities are placed into categories by double-sorting on 2003 values of population, then income. High indicates larger than median values. Lines begin at the origin with 2003 values normalized to zero.

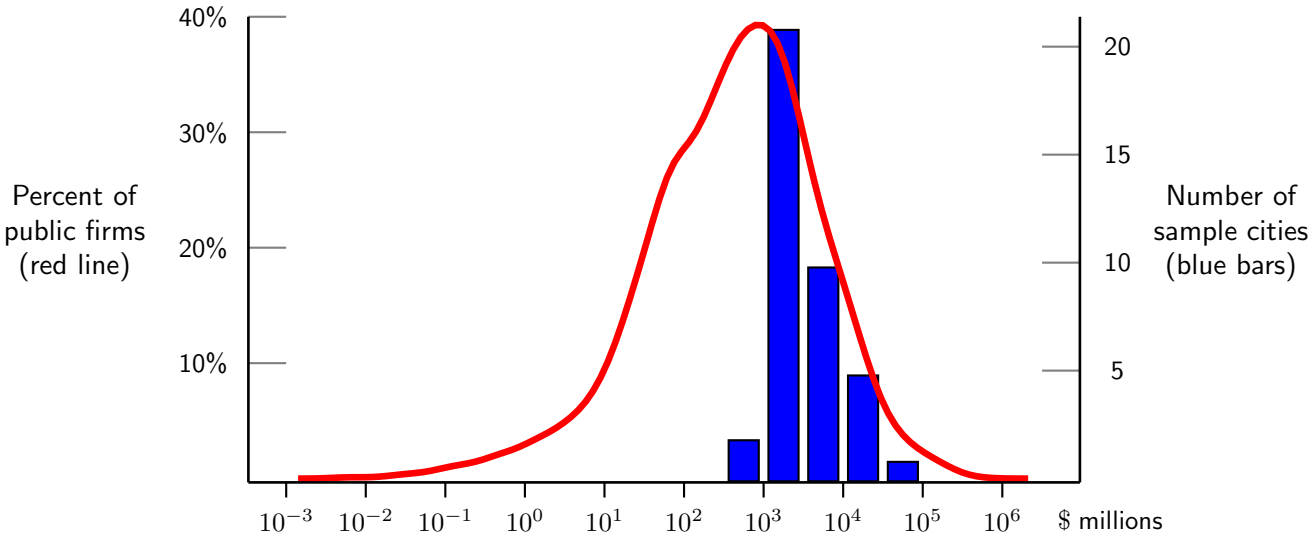
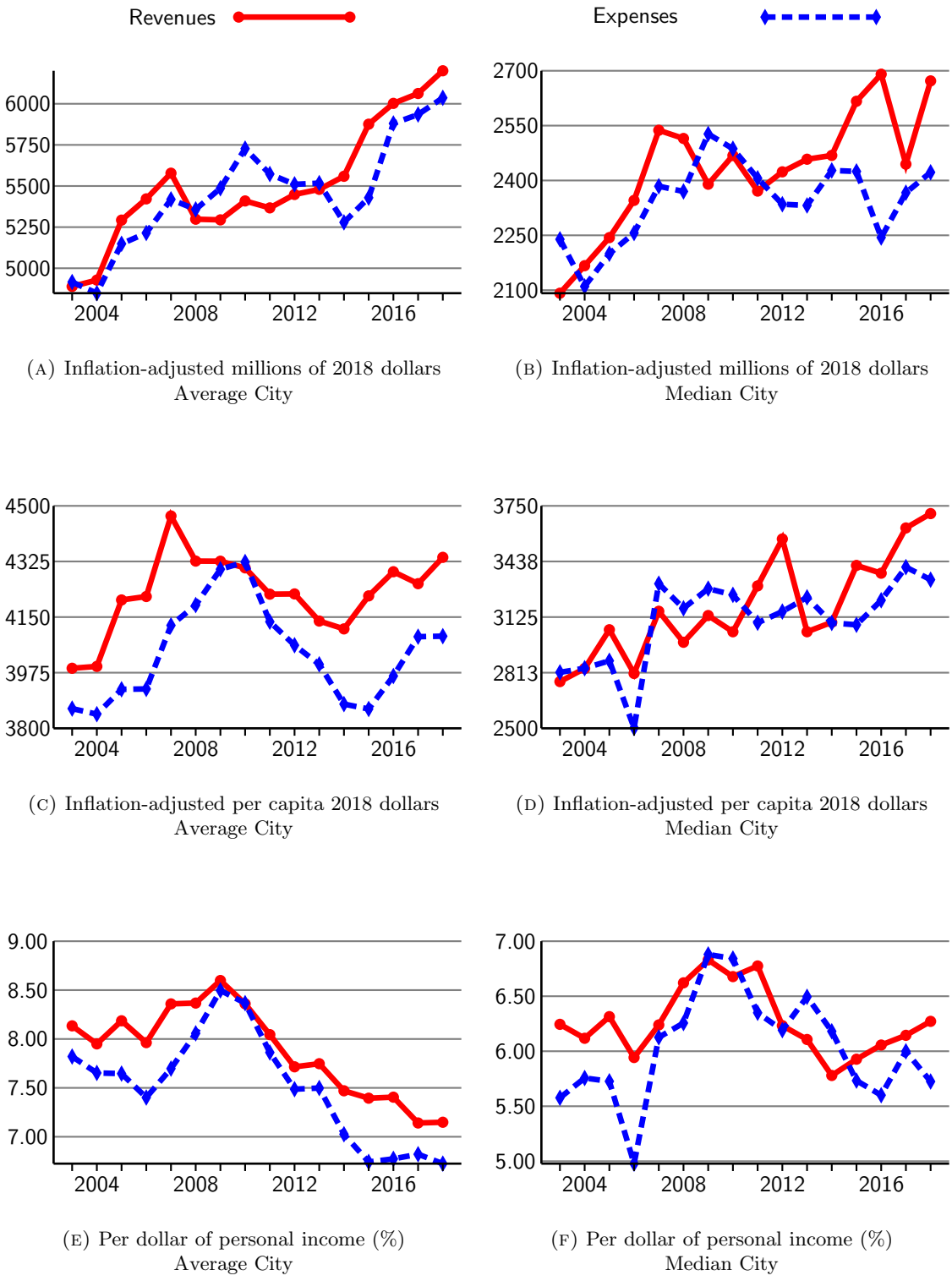


FIGURE IV
Revenues of Publicly Traded Firms vs. Large Cities
Data include 3,817 U.S.-based firms traded on the NYSE, AMEX, and NASDAQ in 2018 and 39 largest U.S. cities.



(A) Inflation-adjusted millions of 2018 dollars
Average City

(B) Inflation-adjusted millions of 2018 dollars
Median City

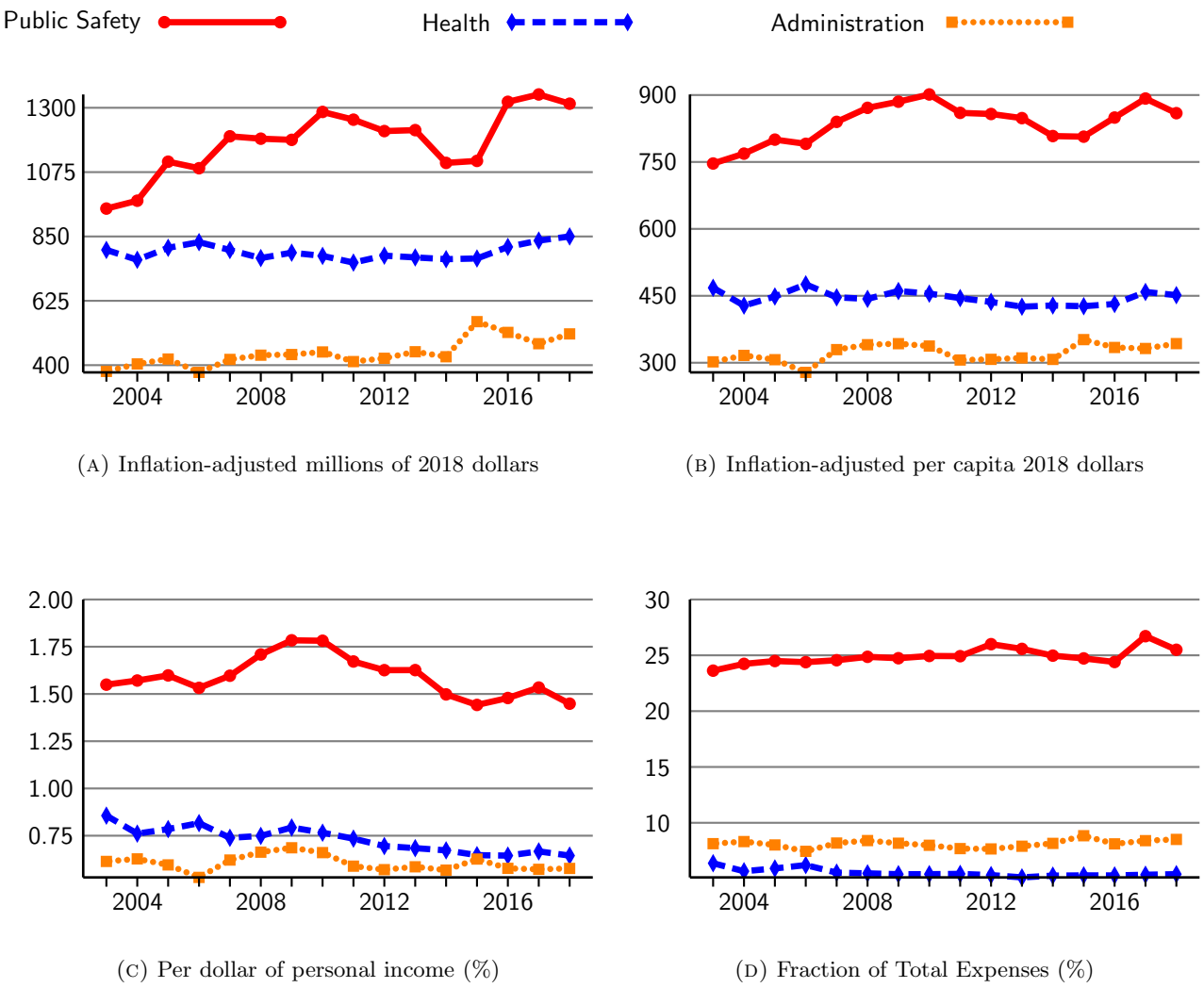
(C) Inflation-adjusted per capita 2018 dollars
Average City

(D) Inflation-adjusted per capita 2018 dollars
Median City

(E) Per dollar of personal income (%)
Average City

(F) Per dollar of personal income (%)
Median City

FIGURE V
Total Revenues and Expenses



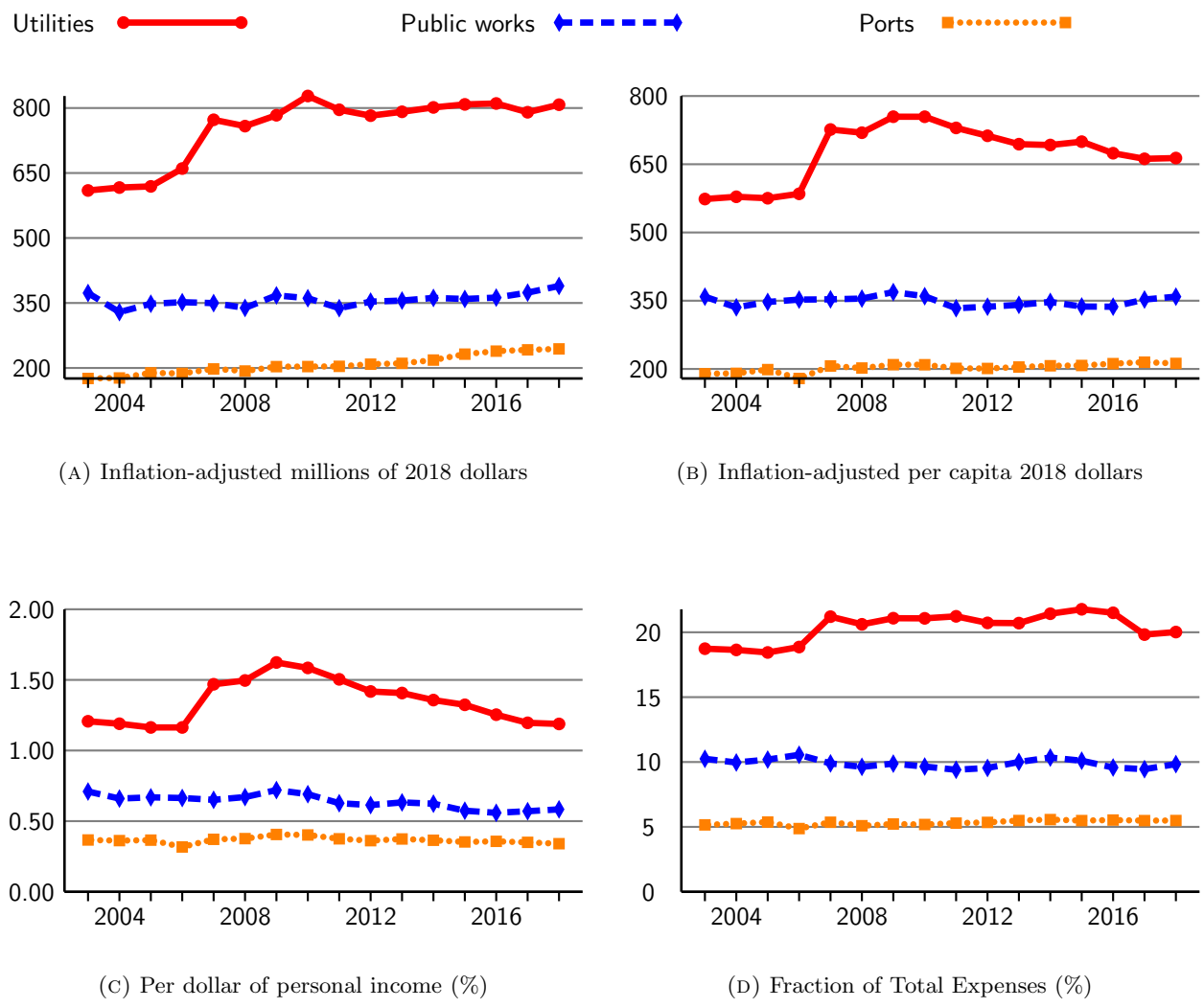
(A) Inflation-adjusted millions of 2018 dollars

(B) Inflation-adjusted per capita 2018 dollars

(C) Per dollar of personal income (%)

(D) Fraction of Total Expenses (%)

FIGURE VI
Expenses on Public Safety, Health, and Administration in the Average City



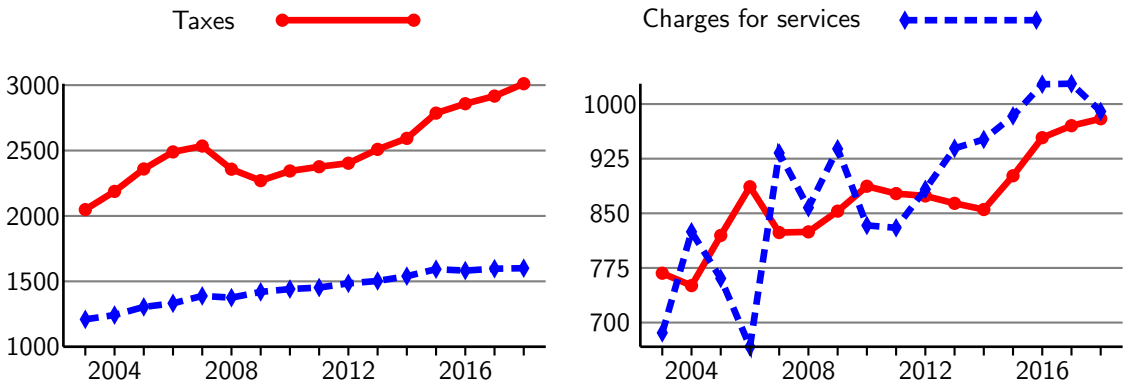
(A) Inflation-adjusted millions of 2018 dollars

(B) Inflation-adjusted per capita 2018 dollars

(C) Per dollar of personal income (%)

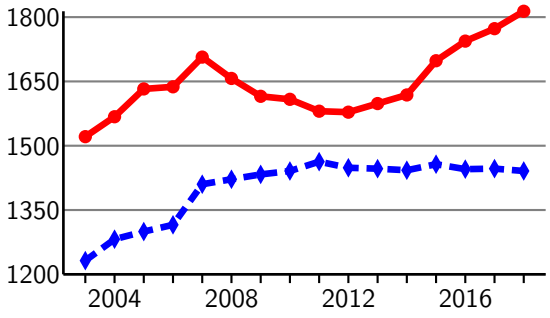
(D) Fraction of Total Expenses (%)

FIGURE VII
Expenses on Utilities, Public Works, and Ports in the Average City

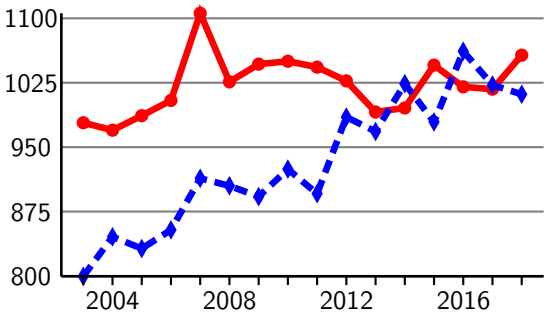


(A) Inflation-adjusted millions of 2018 dollars
Average City

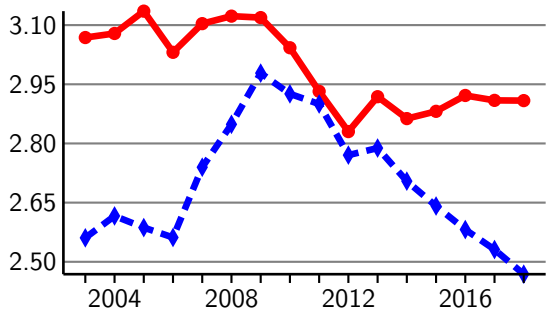
(B) Inflation-adjusted millions of 2018 dollars
Median City



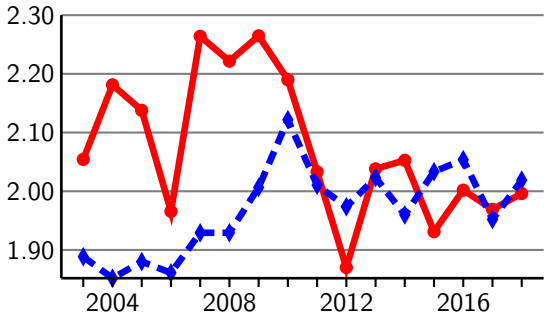
(C) Inflation-adjusted per capita 2018 dollars
Average City



(D) Inflation-adjusted per capita 2018 dollars
Median City



(E) Per dollar of personal income (%)
Average City



(F) Per dollar of personal income (%)
Median City

FIGURE VIII
Taxes and Charges for Services

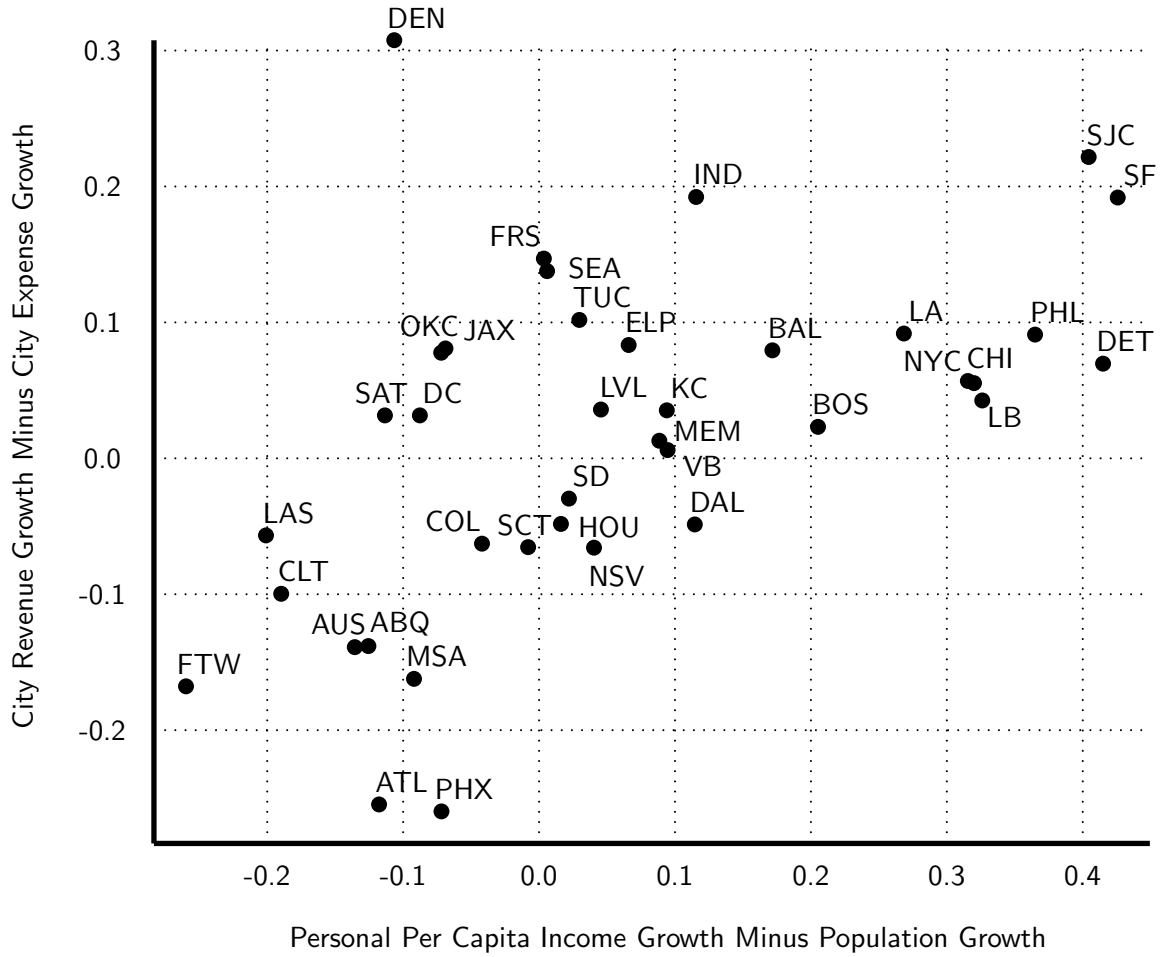
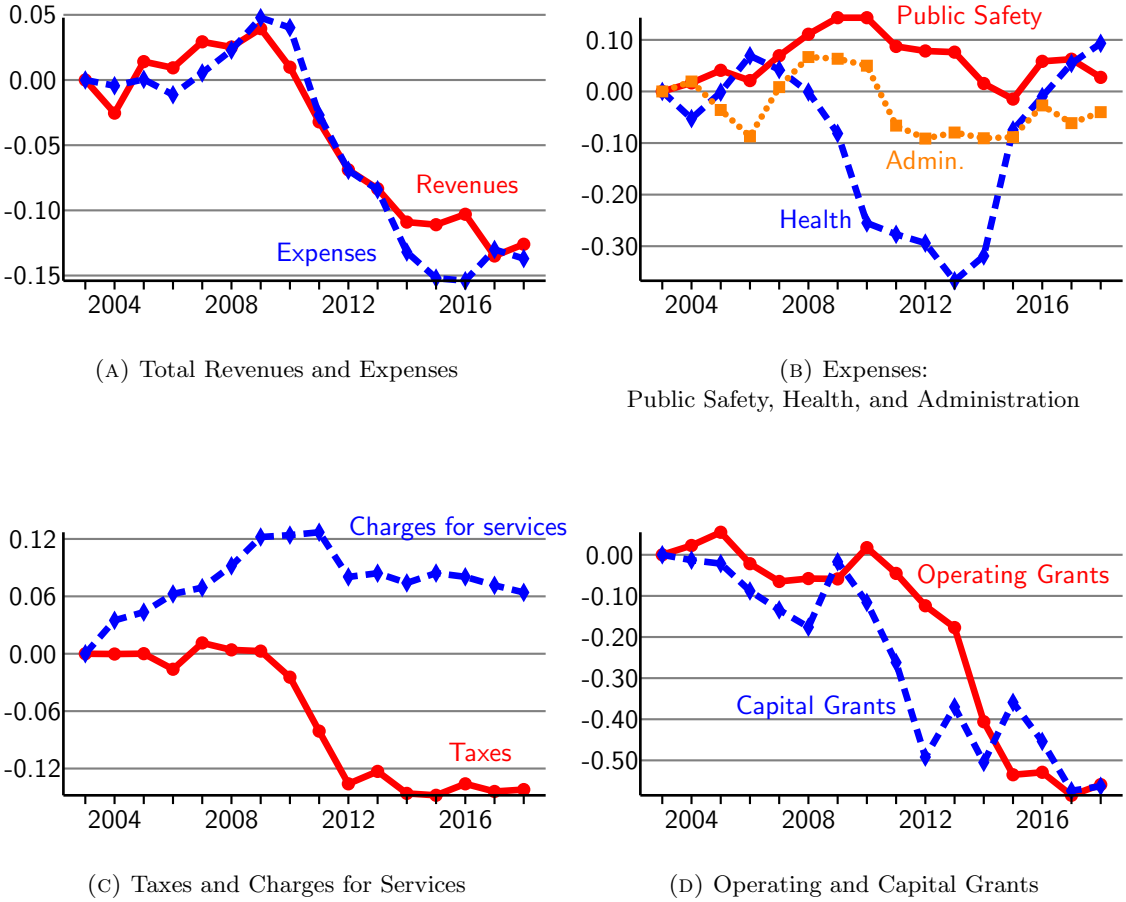


FIGURE IX
The Relationship Between Growth in City Revenues, Expenses, Population, and Income
Growth rates are from 2003 to 2018.



(A) Total Revenues and Expenses

(B) Expenses:
Public Safety, Health, and Administration

(C) Taxes and Charges for Services

(D) Operating and Capital Grants

FIGURE X
Year Fixed Effects Controlling for Population, Personal Income, and City Fixed Effects
Values are logged 2018 inflation adjusted dollars, in relation to the benchmark year of 2003.

TABLE I
FUNCTIONAL AREAS AND GENERAL REVENUES
Panel A provides a non-exhaustive list of the types of services, operations, and departments assigned to each of 11 functional areas, plus interest paid. Panel B provides a non-exhaustive list of the types of taxes assigned to each of 9 tax types.

Panel A: Functional areas

Administration	**Public works**	**Utilities**
General administrative support	Transportation department	Electricity
City attorneys	Mass transit services	Gas
City elected officials	Parking facilities	Water service
Courts	Streets, roads, highways	Storm water drainage
Judicial services	Street lighting	Sewage system
Legislative bodies		Solid waste removal
Finance and budgeting	**Neighborhood**	Sanitation
	Neighborhood support	Recycling
Public safety	Community enrichment	
Police department	Low-income housing	**Ports**
Fire department	Public housing	Airports
Correctional facilities and jails	Community planning	Seaports
Animal control	Strategic planning	Harbors
	Building permits and inspections	Marinas
Education	Building code enforcement	River authorities
Pre-school		
Primary school	**Culture and recreation**	**Development**
Higher education	Cultural centers	Economic development
Adult learning centers	Community centers	Community development
	Convention centers	Land development
Health	Performing arts centers	Housing development
Public health department	City-operated hotels	
Human services	Libraries	**Miscellaneous**
Social services	Museums	All other
Hospitals	Zoos	
Emergency medical response	Tourism bureaus	**Interest paid**

Panel B: Taxes

Property tax	**Entertainment tax**	**Shared tax**
Ad valorem tax	Alcohol tax	Consolidated tax
Personal property	Beverage tax	State shared taxes
Real estate taxes	Cigarette tax	State shared revenues
	Excise tax	
Income tax	Admission tax	**Automobile tax**
Income tax	Gambling tax	Automobile tax
Wage and earnings tax	Hotel tax	Wheel tax
	Occupancy tax	Transportation tax
Sales tax	Meals tax	Motor vehicle fuel tax
Local option sales tax	Prepared foods tax	Gasoline inspection tax
Use tax	Hospitality tax	Parking tax
Transaction tax	Room tax	Motor vehicle ownership fee
	Liquor tax	Petroleum products tax
Business tax		
Business license fee	**Utility tax**	**Miscellaneous tax**
Franchise fee	Emergency telephone	Tax on deeds and documents
Residential construction tax	Phone tax	Interest on taxes
Earnings and profit tax	Utility users tax	Other taxes
Gross receipts tax	Public utility tax	Access to care tax
Business privilege tax	Electric and gas tax	Redevelopment tax

TABLE II
AVERAGE POPULATION, INCOME, EXPENSES, AND REVENUES BY CITY, 2003–2018

	Pop--ulation	Personal Income	City Expenses	City Revenue	City Expenses Per Capita	City Revenues Per Capita	City Expenses Per Income	City Revenues Per Income
Units	thous.	thous.	mill.	mill.	thous.	thous.	%	%
New York	8,234	64.7	78,376	75,763	9.51	9.19	14.73	14.21
Los Angeles	3,849	54.0	13,385	14,479	3.48	3.76	6.48	6.99
Chicago	2,726	53.7	9,748	8,371	3.58	3.07	6.63	5.71
Houston	2,142	53.7	4,990	4,796	2.32	2.23	4.34	4.16
Philadelphia	1,533	49.1	12,996	12,991	8.48	8.48	17.55	17.49
Phoenix	1,498	43.7	3,522	3,856	2.35	2.58	5.39	5.92
San Antonio	1,352	42.7	4,834	4,780	3.56	3.53	8.36	8.27
San Diego	1,325	56.1	3,161	3,484	2.39	2.63	4.27	4.70
Dallas	1,236	52.0	2,436	2,447	1.96	1.98	3.76	3.81
San Jose	962	80.6	2,299	2,093	2.40	2.18	3.07	2.75
Jacksonville	831	46.3	3,864	4,041	4.67	4.87	10.11	10.55
Indianapolis	826	48.1	1,090	1,061	1.32	1.29	2.79	2.70
Austin	822	50.1	3,192	3,220	3.88	3.92	7.77	7.86
San Francisco	817	103.2	8,627	9,086	10.54	11.08	10.32	10.79
Columbus	795	45.8	1,687	1,824	2.12	2.29	4.64	5.02
Fort Worth	750	46.6	1,332	1,430	1.76	1.91	3.78	4.10
Charlotte	746	48.0	1,516	1,997	2.03	2.69	4.25	5.62
Detroit	742	38.5	3,398	3,698	4.48	4.94	11.83	12.86
Memphis	654	44.0	3,894	3,969	5.96	6.07	13.64	13.88
El Paso	646	32.1	880	920	1.36	1.42	4.26	4.45
Seattle	634	69.1	3,223	3,581	5.09	5.65	7.42	8.22
Nashville	633	51.6	2,696	2,537	4.26	4.01	8.29	7.80
Boston	632	70.0	3,472	3,553	5.49	5.62	7.89	8.09
Washington DC	622	64.7	11,804	12,161	18.95	19.53	29.29	30.18
Baltimore	620	57.5	4,066	4,255	6.56	6.87	11.44	11.96
Denver	620	58.4	2,778	3,112	4.50	5.03	7.74	8.63
Portland	606	51.2	1,926	1,915	3.17	3.15	6.22	6.16
Louisville	596	45.5	1,315	1,356	2.21	2.27	4.85	5.00
Las Vegas	589	45.8	874	1,030	1.49	1.76	3.26	3.84
Oklahoma City	587	45.5	1,135	1,324	1.93	2.25	4.24	4.95
Albuquerque	537	41.5	1,037	1,111	1.94	2.08	4.67	5.01
Tucson	524	41.6	997	1,090	1.90	2.08	4.58	5.00
Fresno	495	39.3	695	787	1.41	1.59	3.61	4.07
Sacramento	471	51.6	987	1,085	2.11	2.32	4.11	4.52
Long Beach	466	54.0	1,924	2,122	4.13	4.55	7.72	8.52
Kansas City	463	48.9	1,505	1,708	3.25	3.69	6.67	7.56
Mesa	455	43.7	882	894	1.94	1.97	4.45	4.51
Virginia Beach	442	47.2	2,255	2,399	5.10	5.43	10.82	11.51
Atlanta	440	48.0	1,880	2,264	4.25	5.15	8.87	10.76
Average	1,100	52.0	5,402	5,451	4.05	4.23	7.54	7.90
Median	646	48.9	2,436	2,447	3.25	3.15	6.48	6.16

TABLE III
CITY REVENUES AND EXPENSES: MILLIONS OF 2018 INFLATION-ADJUSTED DOLLARS

Function	Expenses	Charges for Services	Operating grants and contributions	Capital grants and contributions	Net (expense) revenues
Public safety	1,183.3	68.5	61.4	2.2	−1,051.2
	538.9	37.0	17.2	0.0	−482.0
Education	998.9	13.9	398.4	7.5	−579.2
	0.0	0.0	0.0	0.0	0.0
Health	795.0	50.0	346.1	2.7	−396.2
	65.7	3.7	21.7	0.0	−22.1
Utilities	754.6	718.8	6.6	31.8	2.7
	358.3	378.3	0.2	14.8	37.2
Administration	443.6	108.4	72.2	3.5	−259.4
	154.0	50.2	9.3	0.1	−85.9
Public works	357.1	103.9	52.8	66.5	−133.9
	209.5	45.8	22.0	36.7	−87.5
Ports	208.2	198.7	2.9	31.2	24.6
	31.1	25.5	0.0	5.3	0.0
Culture and recreation	190.6	38.1	10.9	10.8	−130.8
	127.5	23.5	4.1	2.3	−81.4
Neighborhood	142.6	25.5	56.0	7.3	−53.9
	38.7	2.7	11.7	0.0	−2.7
Development	108.2	29.5	40.4	8.0	−30.3
	39.5	9.2	8.2	0.0	−3.7
Miscellaneous	112.3	89.4	4.9	3.9	−14.1
	0.0	0.0	0.0	0.0	0.0
Interest paid	167.3	0.0	0.7	0.1	−166.4
	57.0	0.0	0.0	0.0	−57.0
Total	5,462.6	1,444.9	1,053.9	175.6	−2,788.2
	2,369.0	910.2	199.5	115.2	−878.3

The upper number in each cell is the average and the lower number is the median. All numbers are in 2018 inflation-adjusted thousands of dollars.

TABLE IV
CITY GENERAL REVENUE

Revenue Source	Inflation-adjusted $1,000,000s	Per capita	Per personal income (%)	Per total revenue (%)
Taxes				
Property	1,064.1	711.54	1.262	37.0
	413.6	485.53	0.991	37.5
Income	405.1	201.31	0.358	5.8
	0.0	0.00	0.000	0.0
Sales	399.4	276.57	0.511	16.2
	167.1	204.94	0.395	16.3
Business	130.7	156.01	0.294	10.3
	49.8	74.11	0.150	5.8
Entertainment	90.2	80.46	0.152	4.8
	22.6	31.28	0.069	3.1
Utility	53.8	39.46	0.074	2.6
	0.0	0.00	0.000	0.0
Shared	41.3	66.63	0.150	4.8
	0.0	0.00	0.000	0.0
Automobile	18.6	11.69	0.020	0.7
	0.0	0.00	0.000	0.0
Miscellaneous	321.6	121.81	0.208	4.4
	9.3	13.10	0.029	1.0
Total taxes	2,506.6	1,647.73	2.990	84.6
	872.8	1,023.46	2.068	88.7
Grants	129.5	115.87	0.231	5.4
	1.3	1.76	0.004	0.1
Investment income	53.1	51.38	0.098	3.3
	28.2	33.03	0.063	2.1
Miscellaneous revenue	105.6	84.70	0.146	3.3
	22.8	31.26	0.063	2.5
Special items	13.4	19.20	0.038	0.4
	0.0	0.00	0.000	0.0
Transfers	30.4	52.32	0.104	3.0
	0.0	0.00	0.000	0.0
Total general revenues	2,838.6	1,971.19	3.606	100.0
	1,000.7	1,138.00	2.382	100.0
Change in net position	50.4	190.05	0.367	12.8
	104.2	140.10	0.311	10.3

The upper number in each cell is the average and the lower number is the median.

TABLE V
POPULATION, PERSONAL INCOME, EXPENSES, AND REVENUES

	Between Cities			Within Cities		
	log	per capita ($1,000s)	per income	log	per capita ($1,000s)	per income
Panel A: Dependent Variable: Total City Expenses						
log(population)	1.070***	0.172	0.005	1.840***[a]	3.195	0.098**
	(< 0.001)	(0.823)	(0.700)	(< 0.001)	(0.124)	(0.049)
log(personal income)	1.614***	7.994***	0.058	0.245[c]	1.674	−0.045*
	(< 0.001)	(0.001)	(0.145)	(0.279)	(0.118)	(0.067)
Within R^2	0.151	0.001	0.201	0.431	0.171	0.391
Between R^2	0.731	0.271	0.071	0.631	0.051	0.011
Panel B: Dependent Variable: Total City Revenues						
log(population)	1.022***	−0.066	0.001	1.270***	1.131	0.049*
	(< 0.001)	(0.933)	(0.950)	(< 0.001)	(0.336)	(0.081)
log(personal income)	1.544***	8.240***	0.058	0.704***	3.378**	−0.018
	(< 0.001)	(0.001)	(0.153)	(< 0.001)	(0.011)	(0.445)
Within R^2	0.271	0.051	0.161	0.401	0.141	0.261
Between R^2	0.701	0.261	0.061	0.661	0.151	0.001

This table presents regression coefficients from between-effects models (cross-sectional variation across cities' time-series averages) and within-effects models (time-series variation within cities' time-series using city fixed effects and year dummies). The standard errors for within cities regression estimates are clustered by city. Column heading 'log' indicates that the dependent variable is log-transformed; 'per capita' indicates the dependent variable is normalized by population; and 'per income' indicates the dependent variable is normalized by average personal income. p-values from tests on equality to zero are in parentheses. a, b, and c, indicates significance in tests on equality to one in log-log tests.

TABLE VI
POPULATION, INCOME, AND FUNCTIONAL EXPENSES BETWEEN CITIES

Dependent variable:	log(Expenses)		Expenses per capita		Expenses per income	
Independent variables:	Population	Income	Population	Income	Population	Income
Public safety	1.122***	1.107***	0.132	1.117***	0.002	0.004
	(<.001)	(<.001)	(0.176)	(<.001)	(0.155)	(0.417)
Health	2.227	3.752	0.092	2.161**	0.002	0.026*
	(0.120)	(0.378)	(0.759)	(0.020)	(0.630)	(0.075)
Utilities	1.608**	−2.829[b]	0.045	0.113	0.001	−0.011
	(0.016)	(0.150)	(0.796)	(0.828)	(0.708)	(0.291)
Administration	1.174***	1.525**	0.062	0.471**	0.001	0.004
	(<.001)	(0.015)	(0.429)	(0.049)	(0.398)	(0.401)
Public works	1.456**	3.509	−0.104	1.010***	−0.001	0.007*
	(0.044)	(0.104)	(0.140)	(<.001)	(0.239)	(0.052)
Ports	1.989	−3.056	−0.058	0.621**	−0.001	0.006
	(0.202)	(0.512)	(0.520)	(0.027)	(0.645)	(0.258)
Culture and recreation	0.875	−1.468	−0.059**	0.305***	−0.001**	0.002
	(0.118)	(0.377)	(0.028)	(<.001)	(0.034)	(0.166)
Neighborhood	0.188	3.915	−0.040	0.639***	0.000	0.005**
	(0.893)	(0.354)	(0.448)	(<.001)	(0.534)	(0.016)
Development	−1.528[b]	−0.175	−0.049	0.223	−0.001	0.001
	(0.219)	(0.962)	(0.281)	(0.104)	(0.429)	(0.630)

This table presents regression coefficients from between-effects models (cross-sectional variation across cities' time-series averages). At the top of each column is indicated the dependent variable and the the two independent variables (log(population)) and log(personal income)). The dependent variable correspond to the expenses of each city function listed on the rows. Expenses per capita are in $1,000s. p-values are in parentheses.

TABLE VII
POPULATION, INCOME, AND FUNCTIONAL EXPENSES WITHIN CITIES

Dependent variable:	log(Expenses)		Expenses per capita		Expenses per income	
Independent variables:	Population	Income	Population	Income	Population	Income
Public safety	1.074***	0.447**[c]	0.084	0.465***	0.007	−0.008**
	(<.001)	(0.014)	(0.842)	(0.005)	(0.418)	(0.012)
Health	0.513	−1.025	0.368*	0.068	0.009***	−0.010*
	(0.826)	(0.405)	(0.088)	(0.725)	(0.006)	(0.066)
Utilities	−0.647	2.610	−0.017	0.243	−0.001	−0.008
	(0.854)	(0.439)	(0.973)	(0.453)	(0.931)	(0.276)
Administration	1.506***	0.227	0.153	0.156	0.006	−0.002
	(0.002)	(0.693)	(0.497)	(0.390)	(0.109)	(0.498)
Public works	2.468***[c]	−0.032[b]	0.513**	−0.114	0.013**	−0.009**
	(<.001)	(0.946)	(0.034)	(0.654)	(0.043)	(0.018)
Ports	1.588***	0.540*	−0.085	0.026	−0.001	−0.005
	(<.001)	(0.076)	(0.632)	(0.832)	(0.747)	(0.104)
Culture and recreation	1.357	−0.817*[c]	0.150*	−0.063	0.004*	−0.004***
	(0.160)	(0.085)	(0.087)	(0.270)	(0.080)	(0.007)
Neighborhood	−3.890	1.195	−0.030	−0.120	0.000	−0.009*
	(0.413)	(0.531)	(0.819)	(0.667)	(0.881)	(0.078)
Development	2.927	0.581	0.347***	0.052	0.009***	0.001
	(0.394)	(0.889)	(0.002)	(0.774)	(<.001)	(0.646)

This table presents regression coefficients from within-effects models (time-series variation within cities' time-series using city fixed effects and year dummies). The coefficients on the year dummies are not presented. At the top of each column is indicated the dependent variable and the the two independent variables (log(population)) and log(personal income)). The dependent variable correspond to the expenses of each city function listed on the rows. The standard errors are clustered by city. Expenses per capita are in $1,000s. p-values are in parentheses.

TABLE VIII
POPULATION, INCOME, AND REVENUES BETWEEN CITIES

Dependent variable:	log(Revenues)		Revenues per capita		Revenues per income	
Independent variables:	Population	Income	Population	Income	Population	Income
Total taxes	1.061***	1.823***[a]	0.161	3.966***	0.003	0.037*
	(<.001)	(<.001)	(0.700)	(0.003)	(0.669)	(0.074)
Property taxes	1.248***	2.847***[a]	0.013	2.125***	0.000	0.022***
	(<.001)	(0.006)	(0.934)	(<.001)	(0.891)	(0.009)
Income taxes	2.299	−0.578	0.122	0.458	0.002	0.006
	(0.113)	(0.893)	(0.441)	(0.339)	(0.409)	(0.467)
Sales taxes	1.827	5.671	−0.004	0.536*	0.000	0.005
	(0.238)	(0.224)	(0.969)	(0.087)	(0.870)	(0.305)
Business taxes	−0.687	1.945	−0.074	0.349**	−0.001	0.002
	(0.634)	(0.654)	(0.167)	(0.033)	(0.264)	(0.590)
Charges for services	0.921***	0.878*	−0.194	1.772**	−0.002	0.000
	(<.001)	(0.095)	(0.434)	(0.021)	(0.674)	(0.985)
Operating grants	1.137***	2.190**	0.124	1.870**	0.003	0.020
	(<.001)	(0.010)	(0.633)	(0.021)	(0.559)	(0.142)
Capital grants	0.625***[b]	0.633	−0.076**	0.155	−0.001*	−0.001
	(<.001)	(0.172)	(0.031)	(0.140)	(0.052)	(0.671)

This table presents regression coefficients from between-effects models (cross-sectional variation across cities' time-series averages). At the top of each column is indicated the dependent variable and the the two independent variables (log(population)) and log(personal income)). The dependent variable correspond to the revenues type of each city listed on the rows. Revenues per capita are in $1,000s. p-values are in parentheses.

TABLE IX
POPULATION, INCOME, AND REVENUES WITHIN CITIES

Dependent variable:	log(Revenues)		Revenues per capita		Revenues per income	
Independent variables:	Population	Income	Population	Income	Population	Income
Total taxes	1.792***[a]	0.809***	1.581	1.829**	0.046*	0.001
	(<.001)	(0.008)	(0.174)	(0.033)	(0.097)	(0.884)
Property taxes	1.808*	−2.986	0.169	0.615	0.006	−0.004
	(0.057)	(0.389)	(0.700)	(0.185)	(0.437)	(0.299)
Income taxes	0.151[b]	0.119[c]	−0.013	−0.027	0.002	−0.004
	(0.649)	(0.434)	(0.921)	(0.854)	(0.173)	(0.208)
Sales taxes	0.033	0.249	−0.035	0.119*	−0.002***	−0.001
	(0.964)	(0.661)	(0.547)	(0.077)	(0.009)	(0.326)
Business taxes	3.204	−1.161	0.045	0.215	0.000	0.000
	(0.279)	(0.748)	(0.307)	(0.153)	(0.748)	(0.890)
Charges for services	0.829**	0.436	−0.189	0.759	−0.005	−0.017*
	(0.012)	(0.290)	(0.591)	(0.202)	(0.587)	(0.081)
Operating grants	2.212***	0.878	1.554***	0.340	0.041***	−0.006
	(0.004)	(0.316)	(0.009)	(0.349)	(<.001)	(0.603)
Capital grants	1.345	1.614**	−0.323	0.540***	−0.007	0.008**
	(0.153)	(0.019)	(0.199)	(0.005)	(0.215)	(0.014)

This table presents regression coefficients from within-effects models (time-series variation within cities' time-series using city fixed effects and year dummies). The coefficients on the year dummies are not presented. At the top of each column is indicated the dependent variable and the the two independent variables (log(population)) and log(personal income)). The dependent variable correspond to the type of revenues of each city listed on the rows. The standard errors are clustered by city. Revenues per capita are in $1,000s. p-values are in parentheses.

Internet Appendix
"The Business of City Hall"
Kenneth R. Ahern

Appendix A. Data collection

If a city has data issues, the following provides details about the issues and the corrections.

Atlanta

- In 2006, Atlanta changed their fiscal year-end from June to December. Because many expenses and revenues were only recognized in the second half of the year, multiplying the first half of the year by two would produce erroneous financial statements. Therefore, I drop the 2006 observation for Atlanta.
- CAFRs classify business tax and other taxes as miscellaneous starting in 2012. Therefore, I code business tax as zero from 2003 to 2011, and add the listed business tax to miscellaneous taxes starting in 2012.

Albuquerque

- Albuquerque restated government capital assets in 2006. Therefore, I apply these restatements to 2005.

Baltimore

- Baltimore does not separately identify entertainment and utility taxes from 2003 to 2005. Therefore, I record these entries as missing, though the total taxes are complete.

Boston

- The 2009 CAFR has typos. There are zeros for total primary government instead of sums.
- CAFRs list state and district assessments for education expenses as miscellaneous expenses from 2003 to 2007. I recode these as education.
- CAFRs change intergovernmental transfers to public safety expenses in 2008. This reflects that the city of Boston pays the county a fee for public safety. I recode the intergovernmental transfers from 2003 to 2007 as public safety.

Chicago

- Entertainment taxes are included in miscellaneous taxes in the CAFRs from 2003 to 2008. I recode the entertainment tax for this years using the information provided in the notes to the financial statements in the CAFRs.

Dallas

- The CAFRs report a negative public safety expense in 2018. This is because the regular expenses were offset by negative pension expense of $1.2 billion, which lead to a negative expense of $350 million. To correct this, I add the $1.2 billion back to public safety in 2018.
- In 2010, Dallas received a large capital grant of $332 million for the Dallas Center for Performing Arts, funded by private donations. This seems like an erroneous amount for capital grants and contributions in culture and recreation, but it is correct.

Denver

- Business, automobile, entertainment, and utility taxes are included in miscellaneous taxes in the CAFRs for 2003 to 2005, but separated afterwards. I recoded these tax amounts for 2003 to 2005 using the fraction of each type of tax in the 2006 CAFR.

El Paso

- Before 2017, entertainment taxes were recorded as sales taxes in the CAFRs. For consistency, I code entertainment taxes as sales taxes in 2017 and 2018.

Fort Worth

- Following GASB Bo. 68, CAFRs include pension expenses for public safety in 2015–2018, causing a large jump. I decrease the safety expenses by the amount of the new pension expense in 2015–2018.
- Note: Health costs fall to almost nothing in 2009 because the city transfered public health to the county government. No change needed.
- Before 2010, entertainment and sales taxes were included in miscellaneous. I impute their values for 2003 to 2010 using their fraction of the total in 2011.

Fresno

- Development activities fell to zero in 2013 because redevelopment agencies were dissolved by state law in 2011.

Houston

- State level pension change in 2017 caused pension expenses for public safety to fall by $1.9 billion in 2017. I add back this amount for 2017 to maintain consistency.

Jacksonville

- Public safety and administrative expenses spike reported in CAFRs in 2017 and 2018 caused by GASB No. 68 requirements. I subtract the $162.5 million in 2017 plus the inflation-adjusted 2018 value to public safety. I subtract $59,700 from administrative in 2017 and its inflation-adjusted amount for 2018.
- Introduced a business tax in 2010.

Kansas City

- Building department expenses go to zero in 2008 because the building codes department was reclassified into a different function, however, the CAFR does not give enough detail to correct this reclassification.

Long Beach

- In the CAFRs, business taxes were included in miscellaneous taxes from 2003 to 2010, but separated in 2011. I impute business taxes for 2003 to 2010 using their average fraction of total taxes from 2011 to 2018.

Los Angeles

- In the 2003–2005 CAFRs, entertainment and automobile tax are included in miscellaneous taxes, but separated starting in 2006. I impute their values for 2003 to 2005 using later years.

Louisville

- Note: Development expenses jump in 2016 because of a large multi-use development called the Omni Project.
- Note: Utility expenses fall to zero in 2012 because the solid waster utility was sold to a private company.

Memphis

- Before 2007, the CAFRs do not separate business, automobile, income, property, and utility taxes. Therefore, I drop the observations for Memphis from 2003 to 2006.

Mesa

- Note: Mesa introduced a property tax in 2010. This is the first property tax the City has collected in over 65 years and was a result of a voter-approved initiative during 2008. The property tax revenue is restricted to pay for the debt service requirements for general obligation bonds.
- In 2003 to 2006 CAFRS, sales tax is reported as miscellaneous. Using notes to the statements in the CAFRs, I separate sales tax for years 2003 to 2006.

Milwaukee

- Milwaukee does not separate any of its tax categories in the CAFRs from 2003 to 2018. The CAFRs do not provide any information how to separate total taxes into individual tax types. Therefore, I exclude Milwaukee from the sample entirely.

Nashville

- All taxes are aggregated before 2008. Therefore, I drop the observations 2003 to 2007 for Nashville from the sample.

New York

- GASB No. 45 creates a big spike in expenses caused by costs of other pension and employee benefits (OPEB). Therefore, for consistency, I impute the fraction of total OPEB expenses accounted by each functional area and subtract them from the expenses in 2006.
- Entertainment taxes are included in miscellaneous taxes in the CAFRs from 2003 to 2009. Using the notes in the CAFRs, I separate these taxes from 2003 to 2009.

Oklahoma City

- In 2013, the city reclassified business-type activities as a component unit.
- Utility taxes in 2005–2007 are included in miscellaneous taxes in the CAFRs. I impute their individual values for 2005–2007 using CAFRs from later years.

Phoenix

- In 2004, the city reclassified public safety expenses with criminal justice. I recode the 2003 expenses to be consistent with the following years.

Portland

- I could not obtain CAFRs from 2003, 2005-2007.
- In 2015 CAFR, pension liability is added to expenses. The CAFR does not provide enough information to subtract this amount, so I leave it as reported in the CAFR.

Sacramento

- Automobile tax is recorded as property tax in 2003 and 2004. I use the 2005 CAFR to impute the automobile tax for 2003 and 2004.
- The city marina is reclassified from a port to culture and recreation in 2014. I reclassify the marina as culture and recreation in all years.
- Business, entertainment, and sales taxes are combined into miscellaneous tax and not reported separately from 2003 to 2014. There is not sufficient information in the CAFRs to impute their values. Therefore, for consistency, I combine these taxes into miscellaneous taxes for all years through 2018.

San Antonio

- Note: Education expenses spike up in 2015–2018 because the city opened two new schools.

San Diego

- For 2004 only, sales taxes were combined with unrestricted grants and contributions in the CAFR. I impute its value and recode sales tax separately.
- Entertainment tax is combined with miscellaneous taxes in the 2003 CAFR. I impute its value to separate it.

San Francisco

- Entertainment, sales, and utility taxes are combined with miscellaneous taxes in CAFRs for 2003 to 2008. Automobile tax is combined with miscellaneous taxes in the 2003 to 2013 CAFRs. I impute their separate values.

Tucson

- Neighborhood is combined with public safety in all CAFRs. I code the combined entries as public safety.

Virginia Beach

- CAFRs in 2003 to 2005 combine business, automobile, entertainment, sales, and utility taxes. I use data from later CAFRs to impute their seperate values.

INTERNET APPENDIX TABLE I
MAJOR EXPENSES, CHARGES, AND GENERAL REVENUES:
MILLIONS OF 2018 INFLATION-ADJUSTED DOLLARS

	Mean	Std. Dev.	5th	25th	50th	75th	95th
Expenses							
Public safety	1,183.3	2,764.6	228.5	350.9	538.9	818.2	3,055.1
Education	998.9	4,231.2	0.0	0.0	0.0	6.1	3,187.2
Health	795.0	2,953.9	0.0	0.0	65.7	186.2	3,592.1
Utilities	754.6	1,029.2	61.5	198.9	358.3	888.1	3,345.8
Administration	443.6	899.8	37.4	87.9	154.0	321.7	2,492.4
Public works	357.1	456.3	0.0	141.7	209.5	357.9	1,315.2
Ports	208.2	362.9	0.0	0.0	31.1	212.2	1,057.7
Total	5,462.6	12,500.0	822.4	1,266.4	2,369.0	4,068.1	13,500.0
Charges for services (CFS)							
Public safety	68.5	91.2	5.7	24.0	37.0	74.2	300.4
Education	13.9	63.8	0.0	0.0	0.0	0.0	41.7
Health	50.0	163.1	0.0	0.0	3.7	19.5	291.6
Utilities	718.8	957.0	51.5	210.7	378.3	784.2	2,127.0
Administration	108.4	198.6	3.3	18.6	50.2	112.9	421.9
Public works	103.9	183.5	0.0	16.6	45.8	101.2	417.5
Ports	198.7	358.3	0.0	0.0	25.5	223.8	938.2
Total	1,444.9	1,604.7	259.5	426.7	910.2	1,964.2	4,383.0
General Revenues							
Taxes							
Property	1,064.1	3,194.7	46.8	161.9	413.6	746.6	2,108.2
Income	405.1	1,681.7	0.0	0.0	0.0	0.0	1,822.0
Sales	399.4	1,193.2	0.0	0.0	167.1	293.9	1,110.8
Business	2,506.6	7,439.7	296.0	522.7	872.8	1,481.9	5,346.3
Total	2,838.6	7,846.8	349.7	605.8	1,000.7	1,743.2	6,479.9
CFS + Taxes	3,951.5	8,266.3	660.3	1,070.2	1,944.8	3,163.9	11,600.0
Δ net position	50.4	1,108.6	−499.2	−17.4	104.2	249.7	706.3

Internet Appendix Table II
City Revenues and Expenses: Per Capita

Function	Expenses	Charges for Services	Operating grants and contributions	Capital grants and contributions	Net (expense) revenues
Public safety	837.70	63.82	57.50	2.57	−713.82
	705.07	55.11	19.83	0.02	−608.61
Education	518.58	6.43	168.12	4.68	−339.35
	0.00	0.00	0.00	0.00	0.00
Health	445.28	46.51	218.00	2.71	−178.05
	93.74	5.87	27.89	0.00	−25.45
Utilities	676.40	697.12	4.89	37.92	63.53
	482.06	490.51	0.33	19.43	55.50
Administration	322.07	92.08	38.38	5.06	−186.56
	203.16	68.14	10.14	0.11	−107.67
Public works	348.35	90.47	49.63	74.97	−133.27
	270.24	54.62	27.19	42.17	−103.12
Ports	203.04	192.55	4.29	37.16	30.95
	50.97	39.65	0.00	6.77	0.00
Culture and recreation	187.20	42.72	14.83	11.10	−118.55
	168.20	33.79	4.79	2.84	−112.90
Neighborhood	125.82	22.54	51.95	7.15	−44.17
	58.02	4.36	15.73	0.00	−3.87
Development	128.55	35.24	41.95	9.73	−41.63
	59.64	14.32	11.61	0.00	−5.68
Miscellaneous	137.58	114.07	4.30	4.49	−14.72
	0.00	0.00	0.00	0.00	0.00
Interest paid	105.59	0.01	0.11	0.12	−105.35
	75.13	0.00	0.00	0.00	−74.63
Total	4,037.82	1,403.85	654.93	197.89	−1,781.14
	3,173.73	942.16	239.52	147.25	−1,001.51

The upper number in each cell is the average and the lower number is the median. Values are in 2018 inflation-adjusted dollars.

INTERNET APPENDIX TABLE III
CITY REVENUES AND EXPENSES: PER PERSONAL INCOME (%)

Function	Expenses	Charges for Services	Operating grants and contributions	Capital grants and contributions	Net (expense) revenues
Public safety	1.591	0.123	0.100	0.006	−1.362
	1.429	0.109	0.041	0.000	−1.235
Education	0.929	0.012	0.301	0.008	−0.608
	0.000	0.000	0.000	0.000	0.000
Health	0.727	0.062	0.374	0.005	−0.286
	0.182	0.012	0.059	0.000	−0.052
Utilities	1.349	1.393	0.010	0.077	0.131
	1.002	1.045	0.001	0.040	0.117
Administration	0.604	0.180	0.072	0.010	−0.342
	0.403	0.127	0.019	0.000	−0.220
Public works	0.638	0.161	0.097	0.141	−0.239
	0.538	0.112	0.049	0.084	−0.198
Ports	0.365	0.348	0.008	0.075	0.065
	0.119	0.107	0.000	0.012	0.000
Culture and recreation	0.357	0.081	0.029	0.021	−0.225
	0.349	0.072	0.009	0.005	−0.224
Neighborhood	0.213	0.040	0.085	0.016	−0.072
	0.111	0.011	0.030	0.000	−0.008
Development	0.246	0.067	0.083	0.021	−0.073
	0.140	0.029	0.022	0.000	−0.011
Miscellaneous	0.281	0.235	0.008	0.010	−0.028
	0.000	0.000	0.000	0.000	0.000
Interest paid	0.199	0.000	0.000	0.000	−0.199
	0.154	0.000	0.000	0.000	−0.154
Total	7.502	2.703	1.169	0.391	−3.239
	6.122	1.955	0.490	0.301	−2.087

The upper number in each cell is the average and the lower number is the median. All numbers are percentages.

INTERNET APPENDIX TABLE IV
CITY REVENUES AND EXPENSES: FRACTION OF TOTAL REVENUES AND EXPENSES (%)

Function	Expenses	Charges for Services	Operating grants and contributions	Capital grants and contributions	Net (expense) revenues
Public safety	24.93	6.69	12.28	1.73	60.87
	24.62	5.09	10.26	0.01	57.31
Education	7.17	0.82	9.61	2.42	7.95
	0.00	0.00	0.00	0.00	0.00
Health	5.51	2.33	16.91	1.67	4.35
	3.00	0.47	11.61	0.00	2.12
Utilities	20.40	49.80	2.25	19.78	−9.38
	20.08	54.03	0.10	12.96	−5.25
Administration	8.12	8.18	10.61	3.48	11.01
	7.08	5.33	3.12	0.07	9.46
Public works	9.88	7.56	15.93	37.33	6.05
	8.33	4.72	9.01	34.35	6.98
Ports	5.33	11.31	1.04	15.74	−5.93
	2.47	3.49	0.00	4.61	0.00
Culture and recreation	5.86	3.63	5.22	5.95	10.95
	5.33	2.72	1.77	2.00	8.82
Neighborhood	3.46	2.02	13.27	4.56	3.41
	1.78	0.54	2.51	0	0.27
Development	3.41	2.91	11.18	5.01	2.04
	2.47	1.23	2.18	0.00	0.51
Miscellaneous	3.02	4.72	1.40	2.10	0.72
	0.00	0.00	0.00	0.00	0.00
Interest paid	2.86	0.00	0.02	0.06	7.93
	2.59	0.00	0.00	0.00	6.67

The upper number in each cell is the average and the lower number is the median.

INTERNET APPENDIX TABLE V
MAJOR EXPENSES, CHARGES, AND GENERAL REVENUES:
PER CAPITA 2018 INFLATION-ADJUSTED DOLLARS

	Mean	Std. Dev.	5th	25th	50th	75th	95th
Expenses							
Public safety	837.70	459.30	395.76	567.75	705.07	934.34	1,757.75
Education	518.58	1,096.09	0.00	0.00	0.00	11.41	2,990.30
Health	445.28	1,192.14	0.00	0.00	93.74	234.58	2,239.26
Utilities	676.40	631.97	97.46	355.56	482.06	709.16	2,302.07
Administration	322.07	320.11	61.84	120.67	203.16	420.34	970.82
Public works	348.35	336.60	0.00	195.51	270.24	371.68	1,124.65
Ports	203.04	355.29	0.00	0.00	50.97	241.20	1,215.63
Total	4,037.82	3,323.59	1,365.14	1,982.16	3,173.73	4,727.93	10,098.18
Charges for services (CFS)							
Public safety	63.82	45.38	8.08	35.72	55.11	79.69	148.85
Education	6.43	14.57	0.00	0.00	0.00	0.00	41.49
Health	46.51	177.26	0.00	0.00	5.87	20.05	141.08
Utilities	697.12	659.65	66.68	366.09	490.51	732.36	2,424.26
Administration	92.08	89.58	4.99	27.52	68.14	131.00	265.07
Public works	90.47	117.98	0.00	23.84	54.62	112.99	273.93
Ports	192.55	326.78	0.00	0.00	39.65	219.08	1,067.79
Total	1,403.86	975.28	454.40	719.38	942.16	2,046.60	3,335.23
General Revenues							
Taxes							
Property	711.54	749.38	79.30	282.43	485.53	718.07	2,580.43
Income	201.31	599.28	0.00	0.00	0.00	0.00	1,155.10
Sales	276.57	391.42	0.00	0.00	204.94	310.65	987.48
Business	1,647.73	1,771.26	570.16	778.03	1,023.46	1,848.07	4,951.45
Total	1,971.19	2,063.13	633.66	918.42	1,138.00	2,144.00	5,504.23
CFS + Taxes	3,051.58	2,151.85	1,169.84	1,668.01	2,393.55	3,698.46	7,306.22
Δ net position	190.05	472.79	−421.01	−23.41	140.10	380.17	828.98

INTERNET APPENDIX TABLE VI
MAJOR EXPENSES, CHARGES, AND GENERAL REVENUES:
PER INCOME (%)

	Mean	Std. Dev.	5th	25th	50th	75th	95th
Expenses							
Public safety	1.59	0.67	0.79	1.20	1.43	1.81	3.12
Education	0.93	1.95	0.00	0.00	0.00	0.02	5.52
Health	0.73	1.85	0.00	0.00	0.18	0.50	3.78
Utilities	1.35	1.29	0.22	0.71	1.00	1.32	4.44
Administration	0.60	0.55	0.14	0.24	0.40	0.80	1.84
Public works	0.64	0.46	0.00	0.38	0.54	0.76	1.75
Ports	0.37	0.60	0.00	0.00	0.12	0.50	1.64
Total	7.50	5.08	3.16	4.25	6.12	8.76	17.19
Charges for services (CFS)							
Public safety	0.12	0.08	0.02	0.07	0.11	0.16	0.29
Education	0.01	0.03	0.00	0.00	0.00	0.00	0.08
Health	0.06	0.18	0.00	0.00	0.01	0.04	0.24
Utilities	1.39	1.33	0.14	0.69	1.05	1.48	4.79
Administration	0.18	0.18	0.01	0.05	0.13	0.24	0.60
Public works	0.16	0.16	0.00	0.05	0.11	0.21	0.54
Ports	0.35	0.56	0.00	0.00	0.11	0.47	1.97
Total	2.70	1.71	0.85	1.56	1.96	3.80	5.91
General Revenues							
Taxes							
Property	1.26	1.09	0.19	0.61	0.99	1.41	3.90
Income	0.36	0.98	0.00	0.00	0.00	0.00	2.10
Sales	0.51	0.65	0.00	0.00	0.39	0.61	1.74
Business	2.99	2.63	1.28	1.61	2.07	3.48	8.53
Total	3.61	3.16	1.39	1.90	2.38	4.11	9.18
CFS + Taxes	5.69	3.12	2.49	3.53	4.88	7.23	10.03
Δ net position	0.37	0.92	−0.78	−0.04	0.31	0.76	1.49

INTERNET APPENDIX TABLE VII
MAJOR EXPENSES, CHARGES, AND GENERAL REVENUES:
PER TOTAL (%)

	Mean	Std. Dev.	5th	25th	50th	75th	95th
Expenses							
Public safety	24.93	9.18	12.26	17.69	24.62	31.45	41.45
Education	7.17	15.09	0.00	0.00	0.00	0.54	43.04
Health	5.51	7.96	0.00	0.00	3.00	6.35	24.71
Utilities	20.40	14.37	2.10	9.37	20.08	27.30	53.92
Administration	8.12	5.43	2.61	4.85	7.08	9.85	17.63
Public works	9.88	6.48	0.00	5.14	8.33	13.95	21.97
Ports	5.33	7.53	0.00	0.00	2.47	9.57	20.21
Total	100.00	0.00	100.00	100.00	100.00	100.00	100.00
Charges for services (CFS)							
Public safety	6.69	8.55	0.37	2.68	5.09	7.56	12.89
Education	0.82	2.17	0.00	0.00	0.00	0.00	6.58
Health	2.33	4.93	0.00	0.00	0.47	2.24	11.16
Utilities	49.80	23.35	2.39	31.54	54.03	63.92	83.77
Administration	8.18	8.71	0.54	2.57	5.33	10.48	24.16
Public works	7.56	8.12	0.00	2.67	4.72	10.74	20.64
Ports	11.31	15.04	0.00	0.00	3.49	20.60	40.29
Total	100.00	0.00	100.00	100.00	100.00	100.00	100.00
General Revenues							
Taxes							
Property	37.04	18.85	7.85	23.79	37.45	49.83	68.04
Income	5.83	15.03	0.00	0.00	0.00	0.00	30.66
Sales	16.24	15.94	0.00	0.00	16.34	25.21	45.08
Business	84.64	25.70	55.58	79.25	88.73	94.60	98.60
Total	100.00	0.00	100.00	100.00	100.00	100.00	100.00
CFS + Taxes	188.11	94.35	94.48	138.02	173.94	205.68	389.48
Δ net position	12.80	29.89	−27.39	−1.46	10.34	26.30	53.56