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THE BUSINESS OF CITY HALL

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ABSTRACT

Compared to the federal government, the average citizen in the U.S. has far greater interaction with city governments, including policing, health services, zoning laws, utilities, schooling, and transportation. At the regional level, it is city governments that provide the infrastructure and services that facilitate agglomeration economies in urban areas. However, there is relatively little empirical evidence on the operations of city governments as economic entities. To overcome deficiencies in traditional datasets, this paper amasses a novel, hand-collected dataset on city government finances to describe the functions, expenses, and revenues of the largest 39 cities in the United States from 2003 to 2018. First, city governments are large, 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. By 2018, total charges for services equal tax revenue in the median city. Third, controlling for city fixed effects, population, and personal income, large city governments shrunk by 15% between 2009 and 2018. Finally, the growth rate of city expenses is more sensitive to population growth, while the growth rate of city revenues is more sensitive to income. These sensitivities lead smaller, poorer cities' expenses to grow faster than their revenues.

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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. For example, city governments provide essential infrastructure to support the population density needed for agglomeration economies (Fujita and Thisse, 1996), 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, competition in the provision of local public goods may attract people and businesses to migrate to a city (Tiebout, 1956; Banzhaf and Walsh, 2008).

Given municipal governments' integral role in the success of large cities, there is surprisingly little systematic evidence on the economic fundamentals of city governments. For example, urban economics has long studied the determinants of the sizes of cities (Glaeser and Gottlieb, 2009), but in comparison, there is relatively little empirical evidence on the determinants of the sizes of city governments. A better understanding of basic facts about the economics of city governments, such as their revenue sources, their expenditures, and their functional areas, will help shed light on the critical role that city governments play in the development of urban areas.

One potential explanation for the relative paucity of empirical evidence on municipal operations is the lack of reliable data. In contrast to the uniform and mandatory accounting standards of public corporations, cities have historically provided unaudited financial reports using a variety of opaque reporting standards on a fund-by-fund basis. This lack of uniform standards prevents an analysis of the entire government organization as a whole. The standard source of data for empirical research on local government, the Annual Survey of the Census of Governments (ASCG) published by the U.S. Census Bureau, suffers from these same inconsistencies.

In this paper, I overcome existing data limitations by amassing a new dataset on city finances. Following mandated changes in governmental accounting standards in the early 2000s, cities began publishing audited, government-wide financial statements using full accrual-based accounting, consistent with reporting standards for large public companies. However, these data are not published in any publicly-available dataset. Therefore, I hand-collect these financial 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. Though 39 cities may appear to be a small sample, in 2010, these cities had a total population of 42.5 million people within their city boundaries (14% of U.S. population), 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 using consistent accounting standards that exists on city government operations.

The primary purpose of this paper is to provide a descriptive analysis of city governments using this new dataset. In particular, I aim to better understand the cross-sectional and time series variation of large cities' operations and to quantify how city government finances are related to changes in population and personal income.

First, I provide stylized facts about population and incomes of large U.S. cities. Over the period 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 from 2003 to 2018 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. These results suggest that the cross-sectional convergence in incomes documented in Barro and Sala-i-Martin (1992) and Glaeser, Scheinkman, and Shleifer (1995) has reversed in recent years.

Next, I provide three stylized facts about the scale and operations of city governments. First, city governments are large. In a typical year, the average city government spends $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, with 20 of the 39 cities receiving a level of revenues that would rank them in the top five public corporations headquartered in the same city. Given the outsized role large firms play in the economy (Gabaix, 2011), these results suggest that city governments also have a large influence on both local and national economies. However, while the growth of city government expenses was higher than inflation and population growth, expenses per dollar of personal income decreased by 14% over the sample period.

Second, the data show that city governments provide an extremely diverse range of services. The largest expense in the average city is for public safety at $1.2 billion per year 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.

Third, while academics and policy-makers focus on tax policy, cities actually receive a substantial portion of their revenues from non-tax sources. Excluding grants from higher levels of government and revenues from utilities, 21% of the average city's revenues are generated from direct charges for services. This reliance on direct fees has increased over the sample period such that by 2018, the median city generates roughly the same amount of revenue from direct charges for services as it does from taxes.

Having established basic facts about city operations, the second set of analysis studies how population and income help determine a city's expenses and revenues. The focus on population and income is both intuitive and theoretically motivated. In particular, the club model of Buchanan (1965), as applied to municipalities (Berglas, 1976; Hochman, Pines, and Thisse, 1995), predicts that wealthier residents demand more public goods and that larger populations lower the cost per resident of providing public goods but also increase the congestion of the good. In equilibrium, the provision of a local public good is determined simultaneously by population and personal income. Other theories also relate population and income to local public goods, including Wagner's Law and Baumol's (1967) theory of the growth of the public sector.[1] Though these theories motivate the importance of population and income as determinants of city expenses, the paper's goal is not to test a particular theory.

First, in cross-sectional, between-effects models, I find that a city that is 1% more populous than the average city has expenses that are about 1.1% higher than 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 holding income fixed, expenses per capita are statistically equal across cities of different populations, but holding population fixed, cities with higher personal incomes have higher expenses per capita.

To control for omitted factors that vary across cities, including price levels, geography, and governance, I run within-city regressions with city and year fixed effects. 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 relative to expenses, whereas smaller, less wealthy cities in 2003 experienced larger growth in expenses compared to revenues.

Finally, after controlling for city and year fixed effects, population, and income, I find that the size of the average city government peaked in 2009 and declined in every year after. 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

[1]Income and population also play a role in other theories of the provision of public goods that focus on land rents (Stiglitz, 1977), competition among municipalities (Tiebout, 1956), and different municipal revenue sources (Mieszkowski and Zodrow, 1989).

fell from 2009 to 2012 and remained low through 2018. In contrast, charges for services increased from 2003 to 2010, and remained high through 2018. Thus, while the allocation of city resources to various functions has remained relatively constant over time, the source of revenues for cities has shifted from taxes to direct user fees.

The central contribution of this paper is to provide a new description of large city governments as holistic economic enterprises. In particular, the hand-collected data used in this paper provides some of the first accurate, government-wide accounts of city finances. A few recent papers have also used similar data as in this paper to study local governments' responses to economic downturns (Ross, Yan, and Johnson, 2015; Rivenbark, Afonso, and Roenigk, 2018). Prior work in this area includes Dilorenzo (1981), which studies the growth of cities from 1962 to 1977 and Glaeser, Scheinkman, and Shleifer (1995), which studies the growth of cities from 1960 to 1990. Second, while prior work has focused on taxes (Forbes and Zampelli, 1989; Campbell, 2004), and grants (Buetnner and Wildasin, 2006; Gadenne, 2017), my paper also shows that city governments generate a significant and growing fraction of revenue through direct user fees. My paper also provides new estimates of the fraction of total city expenses allocated to important functional areas, such as public safety and public health, which may help inform current public policy debates. More generally, this paper's results help explain how population and income are 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. Data Sources

I.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 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 for 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.

I.B. Comparison of CAFRs with Census Data

Nearly all prior research on local public finance in the U.S. relies on data from the Annual Survey of the Census of Governments (ASCG) published by the U.S. Census Bureau.[2] 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. For example, the CAFR data allows us to observe the expenses, revenues, and contributions specific to public safety functions, whereas the Census data only provide expenses for public safety.

To illustrate some discrepancies between data reported in CAFRs and the Census, consider the following. In its 2012 CAFR, the city of Austin reports total charges for services of $113,747 (in thousands) from governmental activities and $1,960,312 from business-type activities, for a total of $2,074,059. In the ASCG records, Austin's total charges are only $704,342, or about 33% of the level of charges reported in the city's CAFR. However, this discrepancy is not caused by a uniform scaling issue because the value of Austin's total expenditures reported in the CAFR is nearly identical to the value in the ASCG ($2,962,255 vs. $3,002,315). In addition, the discrepancy

[2]Papers that use data from the ASCG include Zax (1989), Glaeser, Scheinkman, and Shleifer (1995), MacDonald (2008), Clemens and Miran (2012), Shoag (2013), Boustan, Ferreira, Winkler, and Zolt (2013), Ferreira and Gyourko (2014), Moretti and Wilson (2017), Feler and Senses (2017), Lafortune, Thostein, and Schanzenbach (2018), and Green and Loualiche (2021).

is not caused by differences in how CAFRs and ASCG categorize budgets into particular line items because both charges for services and total expenses are high-level, aggregate reporting items.

Similar issues are found across nearly all cities in the sample. For example, Long Beach reports property taxes of $179,746 in its CAFR, compared to $254,867 recorded in the ASCG, a 42% difference. Yet, total expenditures are nearly the same ($1,970,303 in the ASCG compared to $1,908,132 in the CAFR). Memphis's charges for services in its CAFR are five times as large as in its ASCG reports, yet total expenses differ by 5%.

In most cases, I cannot find an obvious explanation for the discrepancies, though in some cases, I can deduce the differences. For instance, Philadelphia's property tax reported in the 2012 ASCG is $500,699, which is nearly identical to the property tax collections from governmental functions reported in the CAFR of $500,759. However, the CAFR also reports that the city's component units collect an additional $658,540 in property taxes, for a total of $1,159,299. Because the component units are controlled by the city, they should be included in a holistic evaluation of city operations. Indeed, Philadelphia's component units collected more property taxes than the "core" governmental agencies. Other identifiable reasons for discrepancies that I could identify include omissions in the ASCG data of shared taxes with states and omissions of extraordinary gains from dissolving agencies or selling utilities.

Given two conflicting data sources, we must decide which is more accurate. As mentioned previously, the advantage of CAFRs is that they are audited financial reports that are required to follow full accrual accounting standards. Moreover, these data can be observed directly in a city's annual report. In contrast, the Census data are not audited and are not required to follow consistent accounting standards. There is no primary document available for study and no detailed explanations of reporting decisions, as in CAFRs. Therefore, this paper relies on data from CAFRs because they provide more accurate and complete records than data from the ASCG.

I.C. 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 sometimes 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.

In robustness tests discussed below, I exclude nine city governments that are also county governments: New York, Philadelphia, San Francisco, Washington DC, Denver, Indianapolis, Jacksonville, Louisville, and Nashville. Because these governments include both city and county functions, they are larger than governments that only represent cities and likely provide a different set of services and collect different levels of revenues.

I.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 time-invariant cross-city differences in price levels.

II. 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.

Table II presents a list of the 39 cities in the sample, ordered by population in 2010.[3] The largest city is New York City with an average population of 8.2 million over 2003 to 2018. 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 that during 2003 to 2018, the average person in the average (median) city has a personal income of \$52,000 (\$49,000). The population weighted average income across the 39 cities is \$54,700, considerably higher than the national average of \$48,600. There is large variation between the highest income per capita in San Francisco (\$103,200) and the lowest in El Paso (\$32,000). The correlation between average population and per capita income is 18%, consistent with Glaeser and Gottlieb (2009).

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

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

large variation in population growth across cities. For example, Fort Worth, Charlotte, and Austin's populations grew by more than 40%, while Detroit's population fell by 24%. 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. 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%).

Finally, there is path dependence in population and income growth: smaller cities grew faster than bigger cities, but wealthier cities' income increased faster than poorer cities' income. In particular, the correlation between population in 2003 and population growth from 2003 to 2018 is −26%, while the correlation between income in 2003 and income growth is 61%. To visualize these results, Figure III presents a connected scatter plot of population growth against income growth for four groupings of cities from 2003 to 2018 based on initial conditions. 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 since the early 2000s, the population of large US cities has been converging, while personal income has been diverging. The convergence of populations is consistent with prior research, though the divergence of incomes is a new finding. In particular, Barro and Sala-i-Martin (1992) find convergence in per capita income at the state level from the 1880s to the 1980s. Similarly, Glaeser, Scheinkman, and Shleifer (1995) find evidence of weak convergence in incomes among U.S. cities from 1960 to 1990. However, Glaeser et al. find stronger convergence in incomes from the 1950s to the 1970s than from the 1970s to the 1990s. My findings suggest that the trend towards divergence in incomes across cities has continued through the 2000s. These facts will play an important role in explaining city revenue versus city expenditures, as discussed below.

III. The Profile of Expenses and Revenues of Large City Governments

III.A. The Size of City Governments

Table II reports that the average (median) total expense per city is $5.4 billion ($2.4 billion) per year. New York City has the highest average expenses per year ($78.4 billion), followed by Los Angeles ($13.4 billion). The cities with the smallest expenses are 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 (median) city in an average year has $5.5 billion ($2.4 billion) in revenues, for a positive change in its net position of $49 million ($98 million). The average (median) city's change in net position is 0.9% (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. 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 finding are consistent with persistent city budget deficits reported in Haughwout, Inman, Craig, and Luce (2004).

The average (median) city has $4,047 ($3,250) in expenses per capita. Average (median) per capita revenues are $4,232 ($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). Excluding city-counties, the highest are Baltimore ($6,560) and Memphis ($5,955). In contrast, Las Vegas, Fresno, and El Paso, all have expenses that are less than $1,500 per person.

To adjust for variation in price levels across cities, Table II also reports city finances normalized by personal income. The average (median) city collects 7.9 cents (6.2 cents) in revenue and spends 7.5 cents (6.5 cents) on expenses. Large East Coast cities have the highest revenues per income, including Washington D.C. (30.2%), Philadelphia (17.5%), and New York (14.2%). Excluding city-counties, the highest are Portland (13.8%) and Columbus (12.9%). In contrast, Indianapolis collects only 2.7 cents and San Jose collects 2.8 cents per dollar of personal income.

The above statistics normalize city size by person-level metrics, but they do not provide a good indication of the total scale of city governments. To provide an alternative benchmark, 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. Corporate revenues are centered around $1 billion. 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.

Because cities are geographically concentrated, it is also useful to compare city revenues to the revenues of firms headquartered in the same city. For example, in 2018, 20 out of the 39 cities in the sample had revenues that would rank them in the top five companies by revenues located in the same city. In particular, 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 give specific examples, 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.

These results suggest that the largest cities in the U.S. are comparable to the largest private-sector corporations. Given that Gabaix (2011) finds that the volatilities of the largest 100 firms in the economy explain about one-third of the economy's aggregate volatility, these results suggest that city governments are among the most significant entities in the economy.

III.B. The Growth of City Governments

Figure V presents the time series of total city revenues and expenses from 2003 to 2018. 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%. 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.

These results emphasize that interpretations of growth rates of city governments depend critically on which benchmarks of city size are used. As populations and incomes increase, city governments naturally increase. However, the results show that the size of city governments has tended to decrease relative to the income of the population since the Great Recession.

III.C. City Functional Areas

Table III presents expenses and revenue sources for each of the 11 functional areas.[4] 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

[4]Internet Appendix 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.

($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 is provided by an independent authority. 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.

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 also persistent. 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.

Table III provides the expenses and revenues for the next largest city expenses: utilities, public works, and ports. 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.

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%. 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.

III.D. Revenue Sources

Table III shows that large city governments cover a substantial portion of their expenses with direct fees charged to consumers and with restricted grants and contributions. In the average city-year, cities cover 57% of their expenses with charges for services and grants. Excluding grants, 36% (32%) of total expenses are covered by direct charges and fees in the average (median) city-year. Excluding grants, 21% of total non-utility expenses are covered by direct charges for services.

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 (median) city increased by 47% (28%), while charges for services increased by 32% (44%).

Controlling for population growth in Panels C and D, fee revenue per capita in the average city has been flat since 2007, though tax revenue 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 increased by 27%. Controlling for income growth in Panels E and F, the average city's tax revenue per dollar of income has remained relatively constant around 3%, while fee revenue decreased 17% from its peak in 2009. In contrast, the median city's fees per 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 cover these expenses. Table IV presents the general revenues of the average and median cities. The average (median) city raises \$2.5 billion (\$873 million) in taxes, which is equivalent to about \$1,650 (\$1,025) per person, or 3% (2%) of personal income. Total taxes of the average city are comprised of property tax (42%), income tax (16%), sales tax (16%), and business tax (5%). In contrast, the median city relies more heavily on property and sales taxes, and has no income tax. This suggests that larger cities collect a wider variety of taxes than smaller cities.

IV. 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.

IV.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.[5]

[5] I also run tests with lagged explanatory variables and find qualitatively similar results.

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:

$$\frac{City\ budget\ item_{ct}}{Population_{ct}} = \beta_p \log(Population_{ct}) + \gamma_p \log(Income\ per\ capita_{ct}) + \tau_t + \nu_c + \epsilon_{ct}, \qquad (2)$$

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:

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

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 $\beta_i = \beta_e \times \frac{\text{Dependent variable}}{\text{Income}}$.

IV.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, population and income have a nearly identical relationship with revenues as they do with 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-city 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.

These results are inconsistent with Wagner's Law because city expenditures do not grow at a faster rate than income growth. We do not see that a more productive, complex economy demands higher levels of services. In contrast, the results suggest that higher income cities actually demand lower levels of service. The results do not provide support to Buchanan's club model, either. We would expect the largest cities to have larger congestion costs, leading to a decrease in public services as their incomes' increase. Instead, the results are more consistent with Baumol's cost disease hypothesis. If services are provided on a per capita basis and the public sector does not enjoy productivity gains from technology, then increasing populations lead to the provision of larger amounts of public services by a public-sector that pays inefficiently high wages.

IV.C. The Determinants of Functional Expenses

The above results show that the demand and supply of city expenses depend both on population and income, where expenditures are more sensitive to income than population. To better understand these findings, in Table VI, I run identical tests as before using the expenses of each functional unit as dependent variables, rather than aggregates. 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. This is consistent with the notion that public sector health expenditures are a luxury demanded by wealthier populations. 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, though increases proportionally with population. 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. This is consistent with Buchanan's club model, where wealthier populations substitute private sector goods for public goods. 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.

IV.D. The Determinants of City Revenues

The results presented above shed light on the value of public sector services. However, as shown before, city revenues and expenses are not always equal. Moreover, the results above 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. Thus, taxes increase faster than populations, though charges for services increase in proportion to population. In a club model, we would expect greater reliance on charges as populations increase to offset congestion charges. However, the results show that taxes are more sensitive to population than charges for services. However, the small relationship between charges for services and income could reflect a substitution between public sector and private sector goods as a population becomes more wealthy.

V. Growth Rates of City Finances Controlling for Population and Income

The growth rates discussed previously in this paper do not control for income and population simultaneously. Therefore, Figure X presents the point estimates of the year effects from the within-city panel regressions. 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, these point estimates reflect general trends in city revenues and expenses, controlling for population, income, and time-invariant traits of a city.

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.

Overall, these results provide new evidence on the growth rates of city governments. Holding constant a city's population and income, we see that city governments have been shrinking since the Great Recession. Increases in direct user fees have made up for decreases in taxes and grants. Meanwhile, the largest functional area of a city, public safety, has expenditures that are relatively unchanged since 2003. These results shed new light on important policy issues about the allocation of public funds to different service areas of large cities.

VI. Robustness to Excluding City-Counties

As mentioned previously, nine of the city governments in the sample overlap with a higher government level: Denver, Indianapolis, Jacksonville, Louisville, Nashville, New York, Philadelphia, San Francisco, and Washington D.C. These city-county governments are likely to collect greater revenues and provide more services than would a city government. Therefore, to test how the results of this paper are influenced by the inclusion of these city-counties, I re-run all of the analysis excluding these nine city-counties, leaving a sample of 441 observations, which I denote as the city-only sample.

The city-counties tend to be more populous, which makes the average population of the city-only sample smaller, though the median is only reduced by 1%. Likewise, the median personal income in the city-only sample is only smaller by 2%. As expected, the median city-only government expenses are 26% smaller, though median revenues per income are only 8% smaller. Of the services provided, city-only governments provide much smaller health services, though most other services are roughly unchanged. In terms of revenues, city-only governments rely less on income tax than city-counties.

Excluding city-counties also has an effect on the unconditional time-series of taxes and charges for services. Internet Appendix Figure I shows that in the city-only sample, charges for services are larger than tax revenues in absolute terms and have increased at a considerable rate, relative to tax revenues. In addition, normalizing by personal income, charges for services are larger than taxes.

In the between-effects regressions without city-counties, the elasticity of personal income on expenses and revenues is reduced to roughly unit elasticity, as opposed to 1.5 for the full sample. This implies city-counties's budgets are much more sensitive to income than city only governments. Controlling for city fixed effects, the within-city estimates are nearly identical in the city-only sample as in the full sample. Even in the smaller sample, a one percent increase in population still leads to a larger than 1% increase in expenses, whereas a one percent increase in personal income leads to a smaller than 1% increase in expenses. Likewise, the elastcities on revenues are equal to one in both the full sample and the city-only sample. Finally, the time trends controlling for city fixed effects, population, and income are nearly identical in the city only sample as in the full sample.

Therefore, by and large, the main results are not influenced by the inclusion of the city-counties in the sample. The larger effect appears to be driven by city size, given that some of the larger cities are also counties, such as New York. These tests also help address concerns that some cities provide a different set of services than others. Moreover, these are strong results given that the city-only sample is considerably smaller than the full sample.

VII. 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 estimates the elasticity of city revenues and expenses with respect 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 government in society?

References

Albouy, D., Ehrlich, G., Shin, M., 2018. Metropolitan land values. Review of Economics and Statistics 100, 454–466.

Banzhaf, H. S., Walsh, R. P., 2008. Do people vote with their feet? An empirical test of Tiebout's mechanism. American Economic Review 98, 843–863.

Barro, R. J., Sala-i-Martin, X., 1992. Convergence. Journal of Political Economy 100, 223–251.

Baumol, W. J., 1967. Macroeconomics of unbalanced growth: The anatomy of the urban crisis. American Economic Review 57, 415–426.

Berglas, E., 1976. On the theory of clubs. American Economic Review 66, 116–121.

Boustan, L., Ferreira, F., Winkler, H., Zolt, E. M., 2013. The effect of rising income inequality on taxation and public expenditures: Evidence from U.S. municipalities and school districts, 1970–2000. Review of Economics and Statistics 95, 1291–1302.

Buchanan, J. M., 1965. An economic theory of clubs. Economica 32, 1–14.

Buetnner, T., Wildasin, D. E., 2006. The dynamics of municipal fiscal adjustment. Journal of Public Economics 90, 1115–1132.

Bureau of Economic Analysis, 2019. Local Area Personal Income Methodology.

Campbell, R. J., 2004. Leviathan and fiscal illusion in local government overlapping jurisdictions. Public Choice 120, 301–329.

Chetty, R., Hendren, N., 2018. The impacts of neighborhoods on intergenerational mobility II: County-level estimates. Quarterly Journal of Economics 133, 1163–1228.

Chetty, R., Hendren, N., Kline, P., Saez, E., 2014. Where is the land of opportunity? The geography of intergenerational mobility in the United States. Quarterly Journal of Economics 129, 1553–1623.

Clemens, J., Miran, S., 2012. Fiscal policy multipliers on subnational government spending. American Economic Journal: Economic Policy 4, 46–68.

Dilorenzo, T. J., 1981. An empirical assessment of the factor-supplier pressure group hypothesis. Public Choice 37, 559–568.

Feler, L., Senses, M. Z., 2017. Trade shocks and the provision of local public goods. American Economic Journal: Economic Policy 9, 101–143.

Ferreira, F., Gyourko, J., 2014. Does gender matter for political leadership? The case of U.S. mayors. Journal of Public Economics 112, 24–39.

Forbes, K. F., Zampelli, E. M., 1989. Is Leviathan a mythical beast? American Economic Review 79, 568–577.

Fujita, M., Thisse, J.-F., 1996. Economics of agglomeration. Journal of the Japanese and International Economies 10, 339–378.

Gabaix, X., 2011. The granular origins of aggregate fluctuations. Econometrica 79, 733–772.

Gadenne, L., 2017. Tax me, but spend wisely? Sources of public finance and government accountability. American Economic Journal: Applied Economics 9, 274–314.

Glaeser, E. L., Gottlieb, J. D., 2009. The wealth of cities: Agglomeration economies and spatial equilibrium in the United States. Journal of Economic Literature 47, 983–1028.

Glaeser, E. L., Scheinkman, J., Shleifer, A., 1995. Economic growth in a cross-section of cities. Journal of Monetary Economics 36, 117–143.

Green, D., Loualiche, E., 2021. State and local government employment in the COVID-19 crisis. Journal of Public Economics 193, 1–10.

Handbury, J., Weinstein, D. E., 2015. Goods prices and availability in cities. Review of Economic Studies 82, 258–296.

Haughwout, A., Inman, R., Craig, S., Luce, T., 2004. Local revenue hills: Evidence from four U.S. cities. Review of Economics and Statistics 86, 570–585.

Hochman, O., Pines, D., Thisse, J.-F., 1995. On the optimal structure of local governments. American Economic Review 85, 1224–1240.

Lafortune, J., Thostein, J., Schanzenbach, D. W., 2018. School finance reform and the distribution of student achievement. American Economic Journal: Applied Economics 10, 1–26.

MacDonald, L., 2008. The impact of government structure on local public expenditures. Public Choice 136, 457–473.

Mieszkowski, P., Zodrow, G. R., 1989. Taxation and the Tiebout model: The differential effects of head taxes, taxes on land rents, and property taxes. Journal of Economic Literature 27, 1098–1146.

Moretti, E., Wilson, D. J., 2017. The effect of state taxes on the geographical location of top earners: Evidence from star scientists. American Economic Review 107, 1858–1903.

Rivenbark, W. C., Afonso, W., Roenigk, D. J., 2018. Capital spending in local government: Providing context through the lens of government-wide financial statements. Journal of Public Budgeting, Accounting & Financial Management 30, 402–414.

Ross, J., Yan, W., Johnson, C., 2015. The public financing of America's largest cities: A study of city financial records in the wake of the Great Recession. Journal of Regional Science 55, 113–138.

Shoag, D., 2013. Using state pension shocks to estimate fiscal multipliers since the Great Recession. American Economic Review: Papers & Proceedings 103, 121–124.

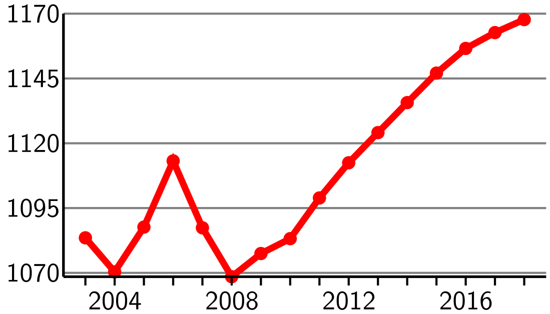
Stiglitz, J. E., 1977. In: Feldstein, M. S., Inman, R. P. (Eds.), The Theory of Local Public Goods Macmillan.

Tiebout, C. M., 1956. A pure theory of local expenditures. Journal of Political Economy 64, 416–424.

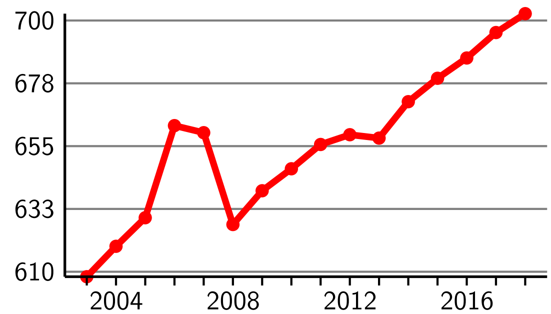
Wallace, W. A., 2000. GASB Statement No. 34: Research opportunities. Financial Accountability & Management 16, 179–199.

Zax, J. S., 1989. Is there a Leviathan in your neighborhood? American Economic Review 79, 560–567.

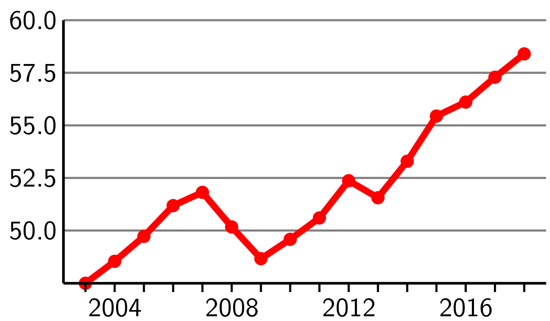
Figure I
Largest 40 U.S. Cities by Population
Note: Milwaukee is dropped from the sample because its financial data is incomplete.



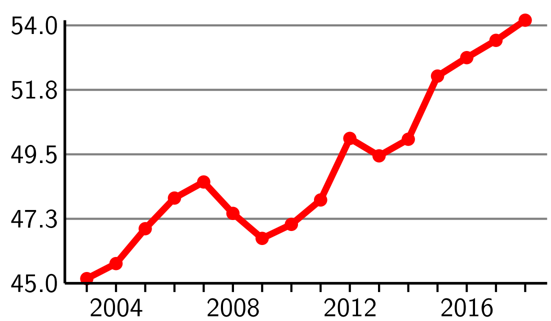
(A) Population (1000s)
Average City



(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.

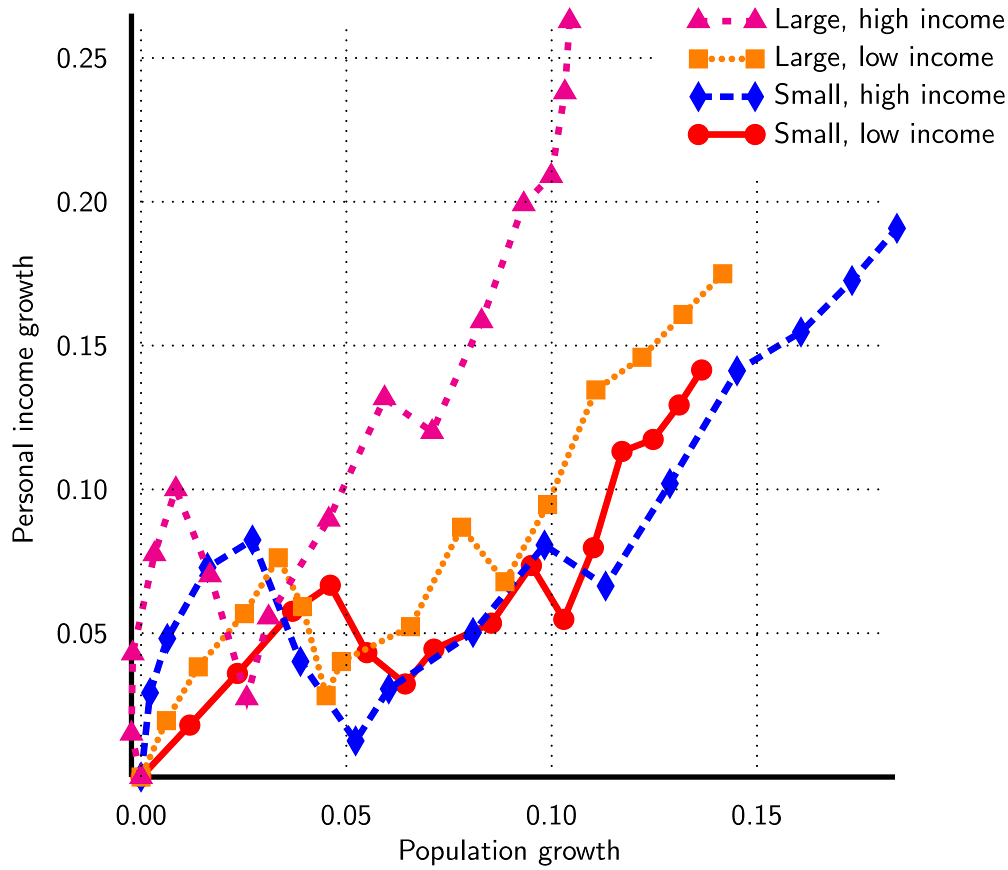


FIGURE III
Population and Income Growth 2003–2018 Based on Population and Income in 2003
Cities are placed into categories by double-sorting on 2003 values of population, then income. High indicates larger than median values. Lines begin at the origin with 2003 values normalized to zero.

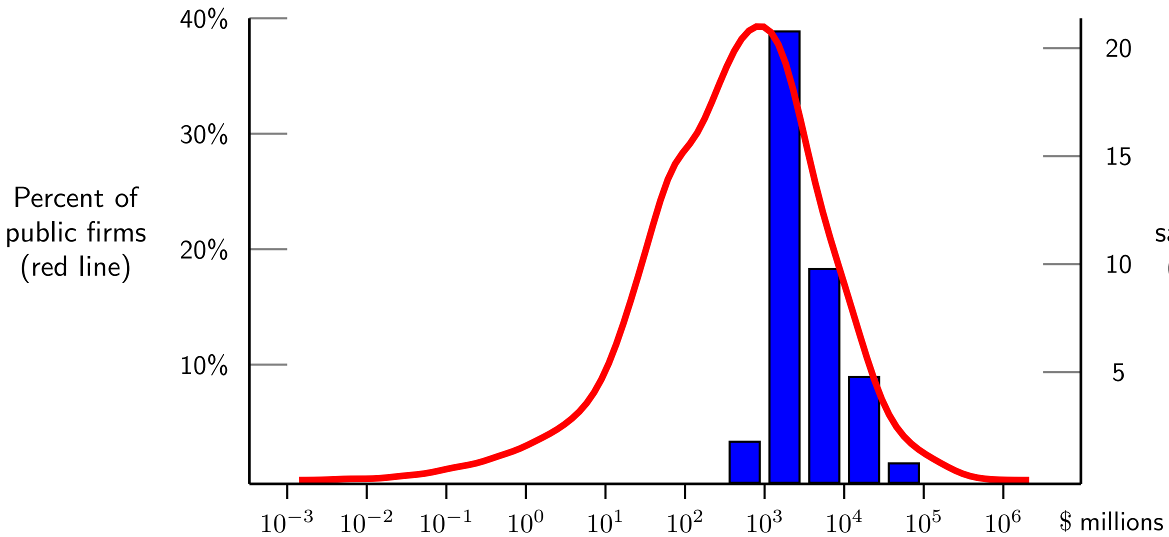
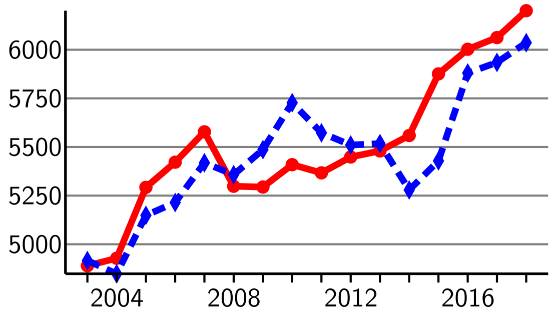
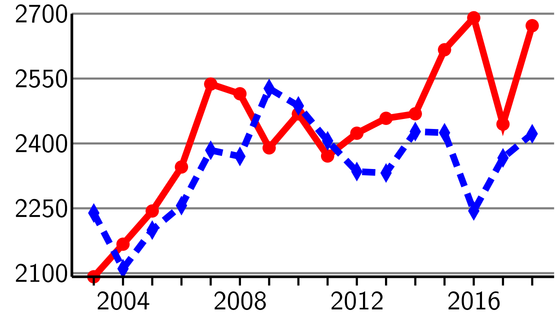


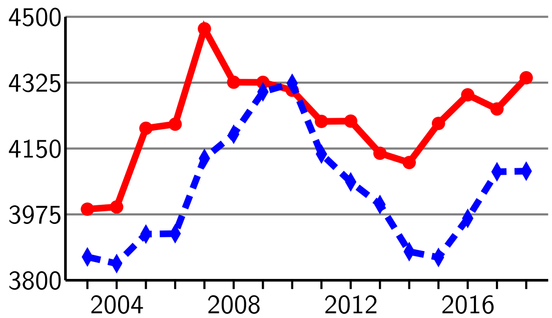
FIGURE IV
Revenues of Publicly Traded Firms vs. Large Cities
Data include 3,817 U.S.-based firms traded on the NYSE, AMEX, and NASDAQ in 2018 and 39 largest U.S. cities.



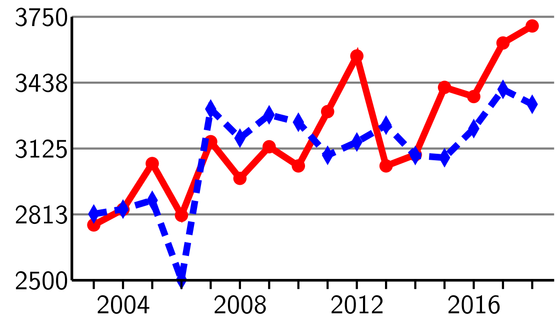
(A) Inflation-adjusted millions of 2018 dollars
Average City



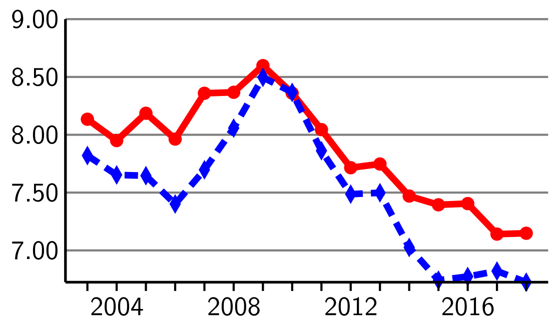
(B) Inflation-adjusted millions of 2018 dollars
Median City



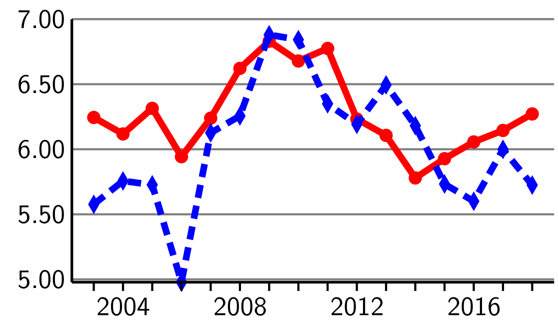
(C) Inflation-adjusted per capita 2018 dollars
Average City



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

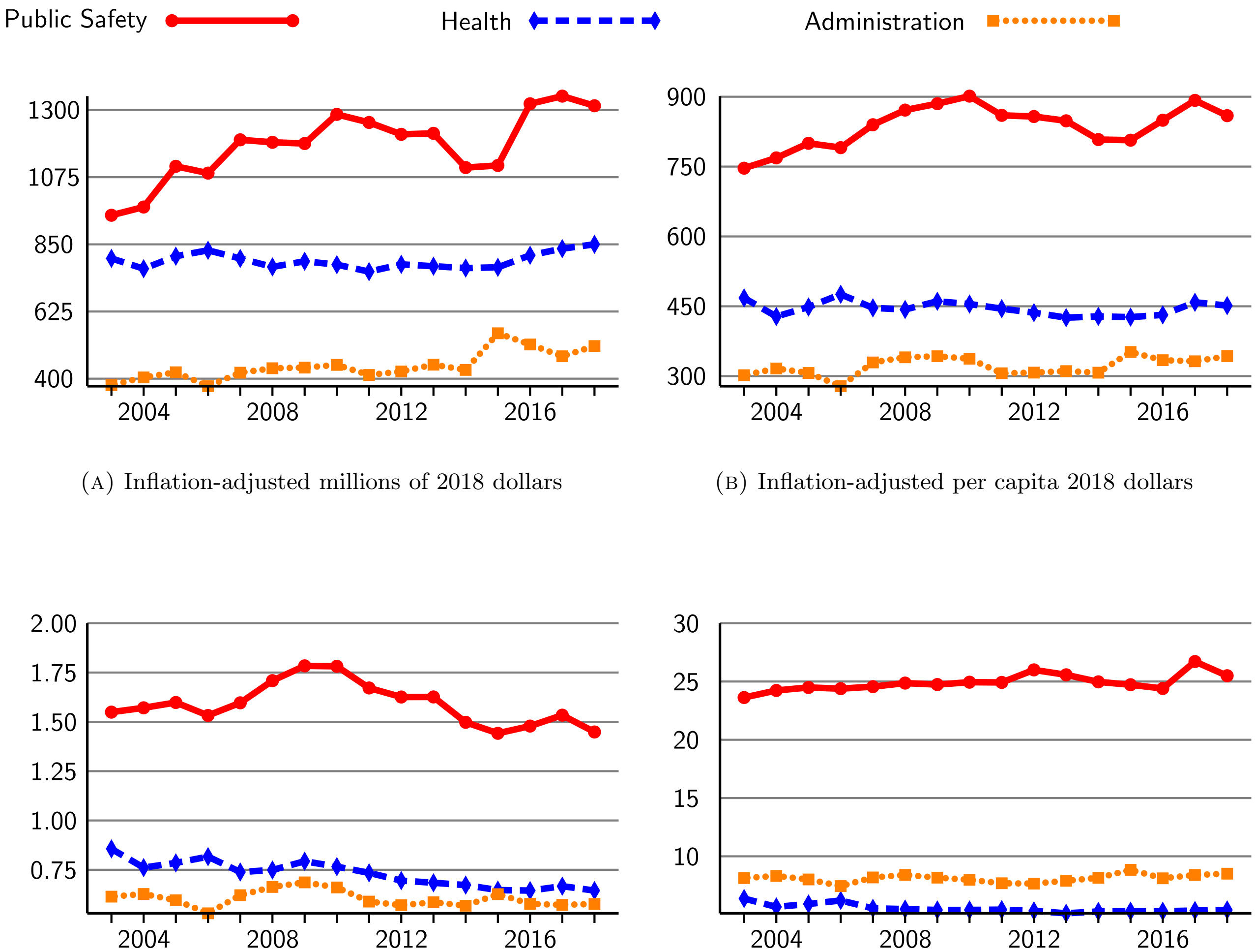


(E) Per dollar of personal income (%)
Average City



(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

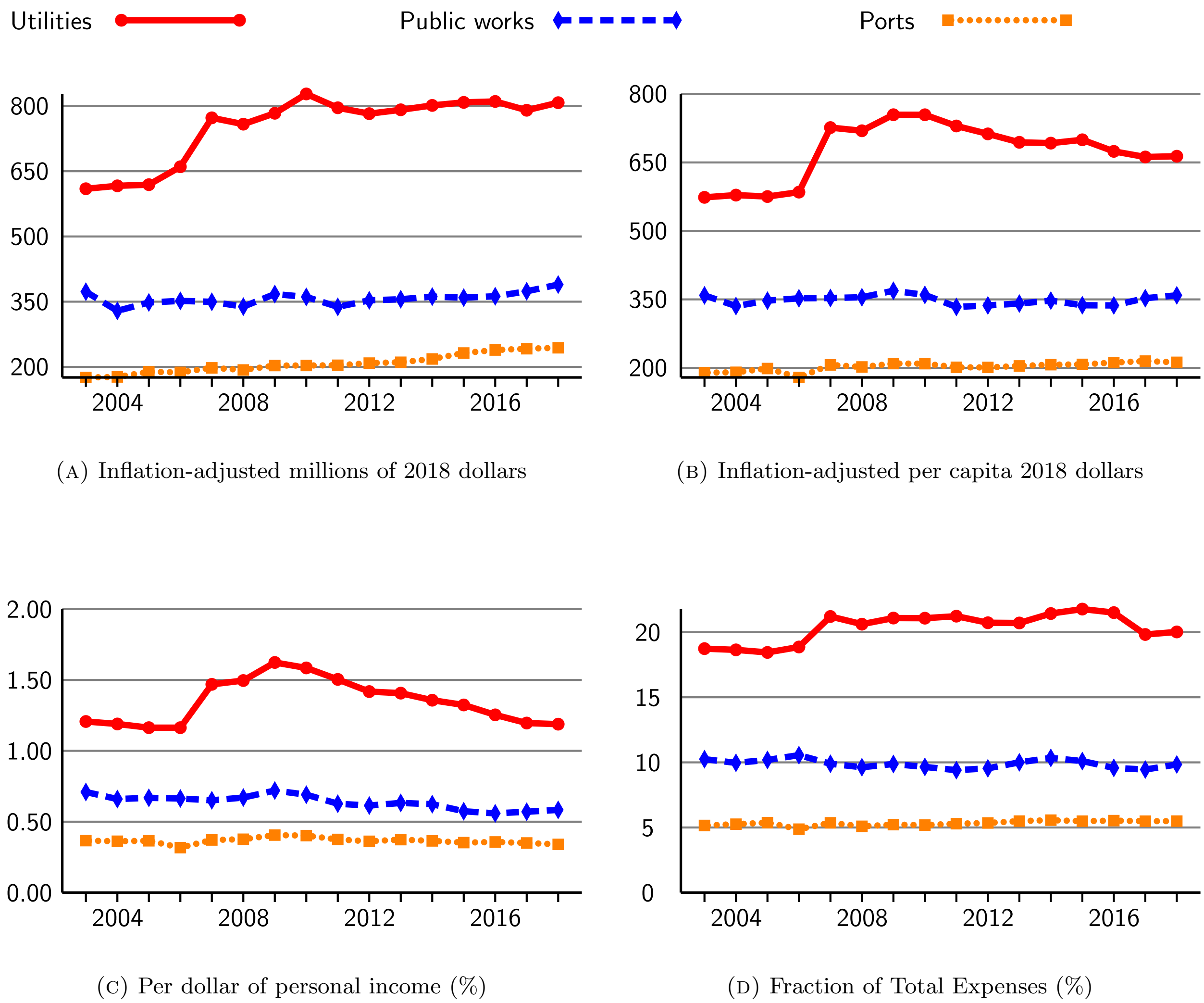
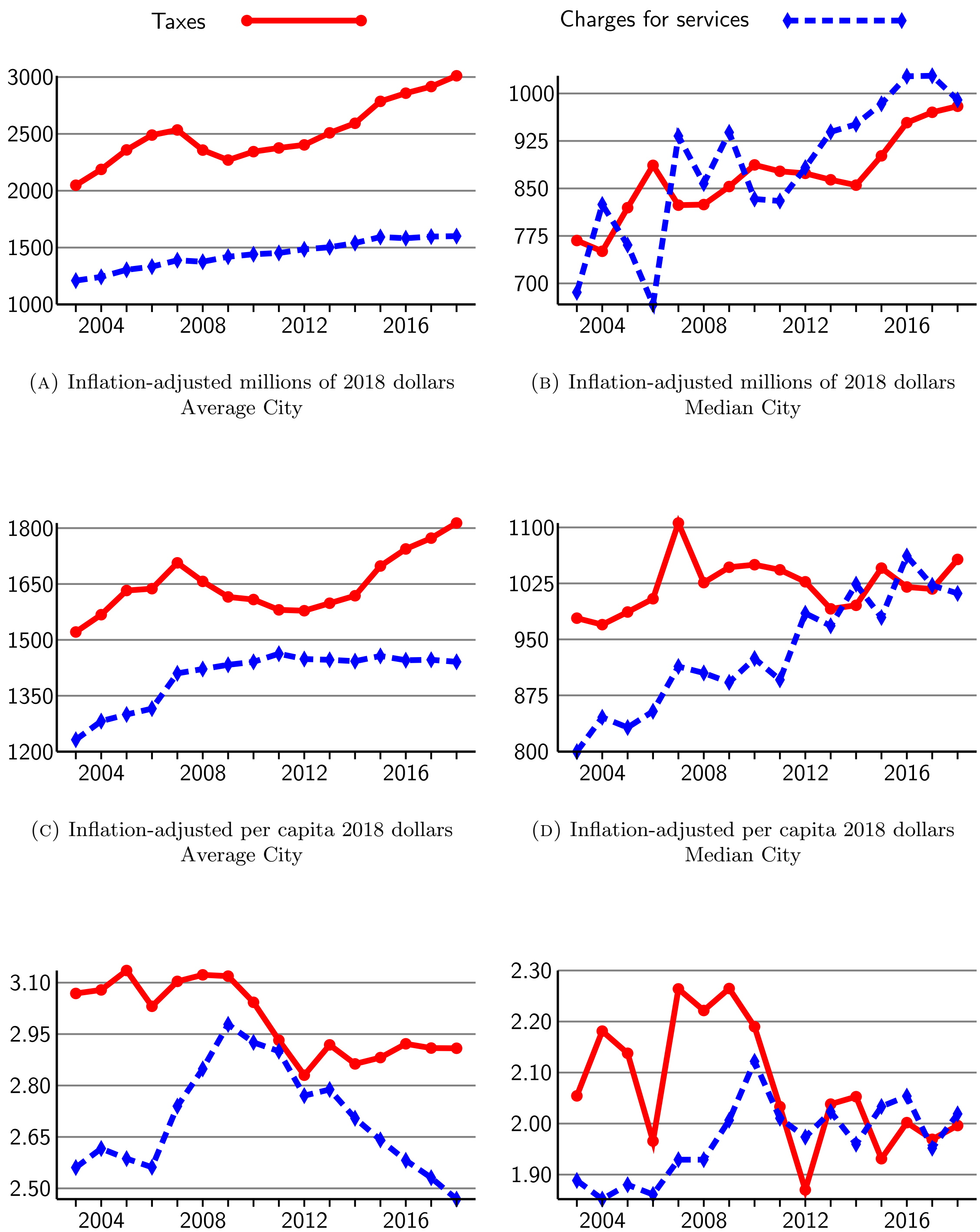


FIGURE VII
Expenses on Utilities, Public Works, and Ports in the Average City



(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

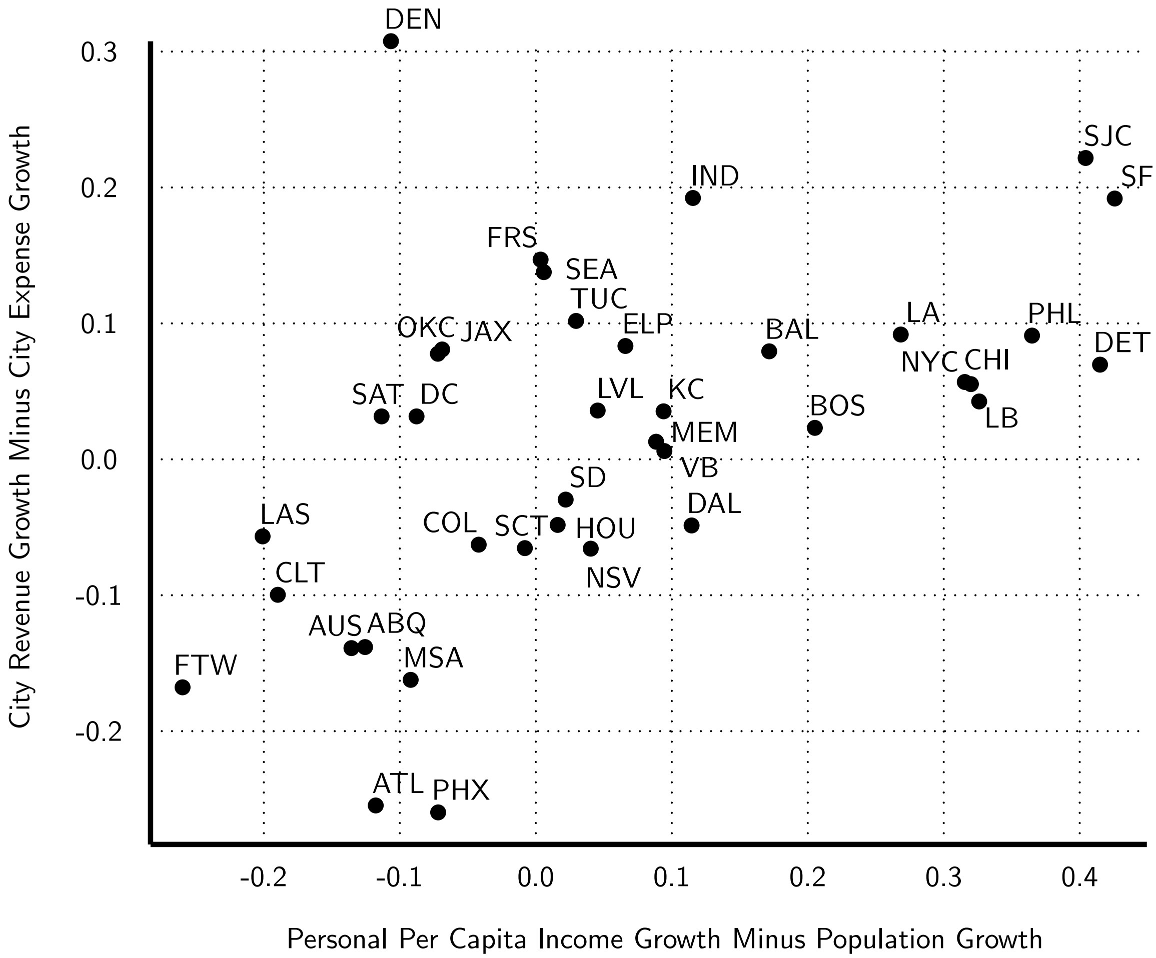
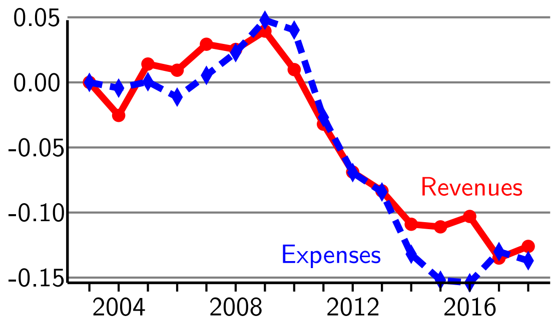
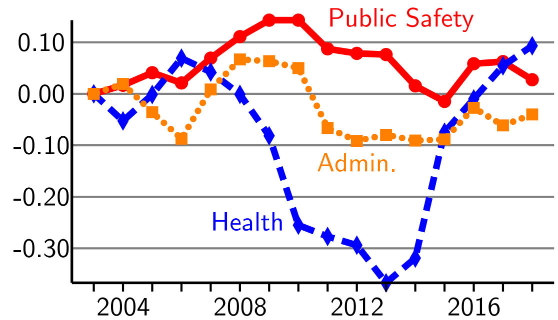


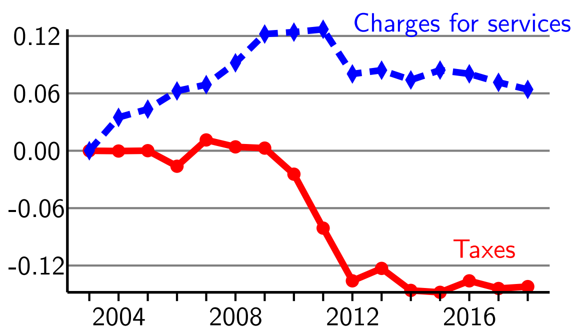
FIGURE IX
The Relationship Between Growth in City Revenues, Expenses, Population, and Income
Growth rates are from 2003 to 2018.



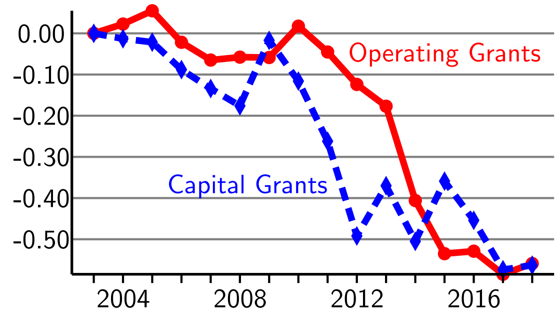
(A) Total Revenues and Expenses



(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	−0.032b	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.