Walking a Tightrope:
Are U.S. State and Local Governments on a Fiscally Sustainable Path?

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Abstract:
This paper develops a new measure of state and local fiscal sustainability called the “trend gap,” which is estimated from a panel data model and removes the short-term influence of business cycles. The paper finds that the nationwide trend gap has been on a growing path over the past three decades, a different conclusion than found in previous studies. Education and social services and income maintenance programs have played a major role in the growth of the trend gap, while public pensions have become increasingly important in driving up the trend gap. The paper projects that the trend gap will continue to grow through 2026 in the absence of policy changes.

Keywords: fiscal sustainability; state and local fiscal trends; fiscal gap

JEL codes: H4, H7
1. Introduction

Policymakers, practitioners, and municipal bond investors alike have become increasingly concerned about the fiscal sustainability of state and local governments in the United States. First, the rapid growth in health care costs faced by state governments has exceeded the growth of their revenue in recent decades. According to the Henry J. Kaiser Family Foundation, the nominal value of nationwide Medicaid spending grew about 10 percent annually between 1990 and 2004. This is much higher than the 6 percent average annual growth rate of nominal state general revenue during the same period. Consequently, Medicaid has replaced elementary and secondary education as the largest state spending category since FY 2009. It accounted for about 27 percent of all state expenditures in FY 2015 (National Association of State Budget Officers 2015).

Second, state and local governments face large unfunded pension and other post-employment benefits (OPEB) liabilities, potentially straining state and local budgets. Recent studies estimate that unfunded liabilities nationwide are around $3 trillion for state-administered pension plans and $1 trillion for OPEB (mostly public retiree health insurance) plans (Novy-Marx and Rauh 2009, Munnell et al. 2011, State Budget Crisis Task Force 2012). Novy-Marx and Rauh (2012) estimate that without policy changes, employer contributions would have to increase to 14.1 percent of state and local governments’ total own revenue in order to achieve full funding of public pension systems over the next 30 years.

The Governmental Accounting Standards Board (GASB), which is the authority to set generally accepted accounting principles for state and local governments in the United States, is concerned about the potential implications of a failure to achieve state and local fiscal
sustainability for intergenerational equity (GASB 2011).¹ In spite of strong interest among policymakers and practitioners, to our best knowledge there are few studies that directly measure state and local fiscal sustainability. This paper aims to fill some of this gap by quantifying state and local fiscal sustainability over the past three decades and forecasting it into future years. Following Chapman (2008) and the GASB (2011), this paper defines state and local fiscal sustainability as the long-term ability of state and local governments to provide public services that the public demands. Based on this definition, the paper develops a new empirical measure called the “trend gap” to represent the long-term imbalance between service needs and revenue-raising ability of states and localities. A larger trend gap indicates less fiscal sustainability.

The paper makes several contributions to the literature. First, it employs a framework that is more consistent with the definition of state and local fiscal sustainability than the ones used in prior research, and as a result of the improved methodology, it finds different results concerning U.S. state and local fiscal sustainability from previous studies. Mahdavi and Westerlund (2011) show that state and local revenues and expenditures were cointegrated from 1961 to 2006 and therefore conclude that state and local governments were fiscally sustainable. However, the cointegration of revenues and expenditures simply suggests a long-term solvency, which Ward and Dadayan (2009) point out is not equivalent to state and local fiscal sustainability. Even Mahdavi and Westerlund (2011) recognize that “Balancing recorded revenue and expenditure flows is not necessarily an indicator of good fiscal health” (p. 967). Ji, Ahn, and Chapman (2015) use similar cointegration techniques to focus on U.S. counties and municipalities. Other previous studies such as Dye and Hudspeth (2010) and those by the U.S. Government Accountability Office (GAO 2008, 2011, and 2012) directly calculate the balance between actual revenues and

¹ Calculating intergenerational equity is intricately complicated due to the fact that some public spending may be viewed as an investment in future generations.
actual expenditures in past years, which is clearly affected by business cycles and idiosyncratic factors. As a result, the GAO finds that its measures of state and local fiscal balance fluctuated with business cycles around zero and showed no trend between 1980 and 2010. Differing from these studies, this paper estimates the trend gap, based on a model of revenue and expenditure, and removes the short-term influence of the business cycle. It is able to show that the nationwide trend gap was on a growing path during the past three decades, suggesting less fiscal sustainability in the aggregate state and local government sector.

Second, this paper develops a sufficiently broad measure of fiscal gap to more accurately portray state and local fiscal sustainability than previous studies often relying on narrowly defined funds. For example, Ulbrich (1997) examines only the state general funds balance of South Carolina. Dye and Hudspeth (2010) study only state funds of Illinois while ignoring its local governments.² The GAO (2008, 2011, and 2012) focuses on the aggregate state and local operating balance net of funds for capital expenditures. Due to a narrower scope, these measures may exhibit different trends than overall state and local fiscal sustainability, especially considering fiscal federalism decisions made between different state and local governments.

Third, this paper, for the first time, uses actuarially required contributions (ARCs) to public pension and OPEB plans as a component of the measure of state and local fiscal sustainability. ARCs are the amounts that state and local governments should contribute to their pension and OPEB plans each year to pay for their workers’ earned retirement benefits in the current year and to amortize a portion of the unfunded accrued liabilities. Therefore, ARCs can

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² Dye and Hudspeth (2010) create a so-called “consolidated budget” for the Illinois state government. It includes general funds, the transportation budget, local aid, debt service, health care provider taxes and fees, and federal grants for special purposes. They then develop three measures of the consolidated budget gap. The first measure is the difference between total receipts and total expenditures of the consolidated budget, with state borrowing included in total receipts. The second measure removes new borrowing in the current year from total receipts. The third measure adds the change in unfunded pension liabilities in the current year to the second measure.
be considered a measure of each year’s long-term costs of state and local retirement plans. However, most of the previous studies ignore public retirement systems. Dye and Hudspeth (2010) consider only the current year’s change in unfunded pension liabilities in one of their measures of fiscal gap and ignore the previous level of unfunded pension liabilities, which the state is still obligated to pay.

Fourth, this paper uses a panel data model that controls for unobserved heterogeneity between states and years to directly estimate state and local fiscal sustainability. Other studies are time-series analyses of either the national aggregate data or data of an individual state (Ulbrich 1997; GAO 2008, 2011, and 2012; Dye and Hudspeth 2010).

Finally, this paper forecasts state and local fiscal sustainability into future years using a regression-based approach that does not rely on the base year’s revenue and spending level. Previous forecasts have simply applied long-term growth rates to actual revenues and expenditures of a base year (Ulbrich 1997; GAO 2008, 2011, and 2012; Dye and Hudspeth 2010). In doing so, they implicitly assume that cyclical and idiosyncratic influences in the base year will persist indefinitely, which would create forecast bias. If the base year is a recession (boom) year, such projections will likely overestimate (underestimate) fiscal gaps.

2. The Concept of State and Local Fiscal Sustainability

A related literature is focused on national/federal fiscal sustainability. A federal government is often considered fiscally sustainable if its budget is intertemporally balanced. Therefore, common tests of federal fiscal sustainability examine whether federal revenues and expenditures are cointegrated or whether the ratio of federal debt to national income remains stable or declines in the long term (see Croce and Juan-Ramón 2003; Afonso and Rault 2010; Bernanke 2010). Auerbach and Gale (2011) suggest that the United States’ fiscal gap, which is
defined as the amount of primary surplus a federal government would need to raise relative to that projected under current policy in order to maintain the current level of debt-to-GDP ratio, is between 5 and 12 percent of GDP over the infinite horizon. Furthermore, Burnside (2005) outlines a theory that defines fiscal sustainability as the ability of government to indefinitely maintain its set of fiscal and monetary policies while remaining solvent. Kotlikoff (2002) discusses federal governments’ ability to use generational accounting to dictate future monetary policy to achieve a sustainable policy.

As Chapman (2008), Ward and Dadayan (2009), and others point out, these concepts of federal fiscal sustainability are of limited use for studying states and localities for two reasons. First, federal fiscal sustainability is focused on solvency, while solvency is generally not considered a key to state and local fiscal sustainability because of current legal constraints facing state and local governments (Ward and Dadayan 2009). Federal law explicitly prohibits state bankruptcy. Municipal bankruptcies are rarely observed, partly because local governments’ access to bankruptcy is rather restricted. Localities in 35 states need permission from their state government to file for Chapter 9 protection (Gramlich 2011).

Second, state and local governments and the federal government operate under different fiscal rules. Unlike the federal government, all states except Vermont have a constitutional or statutory balanced budget requirement. Nevertheless, the balanced budget requirement usually applies only to general funds and may not be stringent in some states (National Conference of State Legislatures 2010). State and local governments are also subject to tax and spending limitations, which do not exist at the federal level.

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3 There have been only about 640 municipal filings for bankruptcy in the United States since 1937 (Reid 2012). However, it is unclear how this may change following the recent proceedings allowing Detroit to declare bankruptcy.
Compared with federal fiscal sustainability, state and local fiscal sustainability is a relatively new concept. Chapman (2008) defines state and local fiscal sustainability as “the long-run capability of a government to consistently meet its financial responsibilities. It reflects the adequacy of available revenues to ensure the continued provision of the service and capital levels that the public demands” (p. 115). Similarly, the GASB (2011) views state and local fiscal sustainability as a government’s ability and willingness to generate revenue needed to meet both current service commitments and financial obligations when they come due, without shifting financial burdens to future periods.

State and local fiscal sustainability should thus refer to the long-term ability of state and local governments to provide public services that their constituents demand. Such ability of state and local governments should be determined by socioeconomic and other fundamental characteristics of each jurisdiction. Because it is a long-term concept, a measure of state and local fiscal sustainability should focus on fiscal trends and should not reflect the short-term influence of business cycles. Based on this definition, we develop a conceptual framework and a measure of state and local fiscal sustainability called “trend gap,” which we explain in detail in the next section.

3. Conceptual Framework

This section presents a simple conceptual framework to provide guidance for developing the empirical estimation equations. State and local services demand \( S_d \) is largely determined by resources available for the jurisdictions (R) and preferences of their constituents (D),\(^4\) such that

\[
S_d = S_d(R, D).
\]

\(^4\) We tried including median household income divided by total personal income as a proxy measure of tax price (also called tax share) facing the median voter in each state. This tax price variable was not statistically significant and its inclusion did not fundamentally affect other results.
To meet such demand, governments produce public services \(S_s\) depending on the size of their expenditures \(E\) and the so-called “environmental costs” \(C\), such that

\[
S_s = S_s(E, C).
\]  

(2)

Bradford, Malt, and Oates (1969), who first introduced environmental costs, point out that, holding all else equal, a jurisdiction with a harsher socioeconomic environment that is outside the direct control of government has to pay more to obtain the same level of public services. The unemployment rate is a typical environmental cost factor, because a jurisdiction with a higher unemployment rate is likely to experience a higher crime rate and a larger service caseload than a similar jurisdiction with a lower unemployment rate.\(^5\)

Through a standard inversion of the production function, we can derive an expenditure function given by

\[
E = E(S_s, C).
\]  

(3)

Because the level of public services \(S_s\) is often unobservable and also depends upon service demand \(S_d\), we substitute for it with \(S_d\), which is a function of variables that are more easily observable, \(R\) and \(D\), based on equation (1). We can rewrite the expenditure function as

\[
E = E(R, D, C).
\]  

(4)

State and local governments need to collect sufficient revenue to fund the demanded services. The literature typically models revenues \(T\) as a function of resources available to governments \(R\) and their tax policies \(\tau\), such that

\[
T = T(R, \tau).
\]  

(5)

\(^5\) For example, Klerman and Haider (2004) show that the declining unemployment rate explains about half of the welfare caseload decline in California in the 1990s.
Tax policies are endogenous and influenced by available resources (R) and preferences of the constituents in each jurisdiction (D),\(^6\) such that

\[ \tau = \tau(R, D). \]  

(6)

Therefore, we can substitute for \(\tau\) and rewrite the revenue function as\(^7\)

\[ T = T(R, D). \]  

(7)

Business cycles obviously affect determinants of revenue and expenditure, such as personal income (a proxy for available resources) and unemployment rates (an environmental cost factor). As a result, state and local revenues and expenditures fluctuate over business cycles. However, these relatively short-term fluctuations do not reflect changes in the long-term ability of state and local governments to provide public services.

Therefore, we adjust available resources and environmental costs (\(\hat{R}, \hat{C}\)) to remove the short-term effects of business-cycle variations. We define the so-called “trend revenue” (\(T_L\)) and “trend expenditure” (\(E_L\)) as

\[ T_L = T(\hat{R}, D), \]  

(8)

\[ E_L = E(\hat{R}, \hat{C}, D). \]  

(9)

Trend revenue represents the long-term ability of state and local governments to raise their revenues from available resources. Trend expenditure represents the state and local spending amount needed to meet public service demand and fulfill these governments’ long-term financial obligations. The “trend gap” (\(G_L\)) is therefore defined as

\(^6\) Equation (6) allows tax rates and other fiscal policies to change, as available resources and preferences of the constituents in each jurisdiction change over time. By treating tax policies as endogenous, we indirectly account for some policy changes over time. Therefore, the responses of revenue and expenditure to the business cycle that we later remove likely include both the mechanical responses (such as declines in revenue due to a decline in the tax base during a recession) and cyclical policy actions (such as raising tax rates or collecting more fees and charges during a recession to offset declines in the tax base).

\(^7\) As equations (4) and (7) show, available resources and preferences determine both revenue and expenditure, which reflects the fact that revenue and expenditure are interdependent.
Unlike the actual budget gap, the trend gap reflects the long-term imbalance between service demand and the revenue-raising ability of state and local governments. The larger the trend gap, the lower the long-term ability of state and local governments to provide demanded public services, reflecting less fiscally sustainable state and local governments.

4. Empirical Specification

We estimate a reduced form of equation (4) and equation (7) as follows:

\[
\log T_{i,t} = \alpha_1 \log I_{i,t} + \beta_1 i H_{i,t} + Z_i + Y_t + \mu_{i,t},
\]

\[
\log E_{i,t} = \alpha_2 \log I_{i,t} + \delta_2 \log F_{i,t} + \gamma_2 C_{i,t} + \beta_2 i H_{i,t} + Z_i + Y_t + \nu_{i,t},
\]

where \( T \) and \( E \) are real per capita revenue and expenditure categories (measured in 2010 dollars).\(^8\) \( I \) and \( F \) are real per capita personal income and federal revenue transfers (measured in 2010 dollars) that capture available resources for state and local governments to tap. \( C \) is the unemployment rate, which serves as a proxy to capture environmental costs.\(^9\) \( H \) is state-specific linear and quadratic time trends that capture the growth pattern of revenue and expenditure within states, while also potentially capturing the evolution of state preferences over time. \( Z_i \) is state fixed effects that capture non-time-varying state-specific culture, politics, and preferences, as well as each state’s fiscal institutions. \( Y_t \) is year fixed effects that capture year-specific macroeconomic shocks. Finally, \( \mu_{i,t} \) and \( \nu_{i,t} \) are residual terms, which could be correlated, because governments simultaneously make revenue and spending decisions. Therefore, we use

\(^8\) Because the coefficients \( \alpha, \beta, \delta, \) and \( \gamma \) do not vary by state in these regression models, the analysis of state-level trend gap are likely imprecise. Doing state-level comparisons also requires incorporating more state institutional and other variables, which deserves a separate future study. Therefore, this paper focuses on estimating the trend gap of the U.S. state and local government sector as a whole.

\(^9\) As robustness check, we explored other potential environmental cost factors such as the poverty rate, population density, jobs per capita, the percentage of the population that is foreign born, the percentage of the population that is black, and the percentage of the population that is Hispanic. We find that the results are robust to the inclusion of these alternative environmental cost factors that themselves are not statistically significant.
seemingly unrelated regressions to simultaneously estimate the revenue and expenditure equations. Finally, we cluster standard errors at the state level to allow for potential correlations within each state over time.

One may be concerned that some of these explanatory variables are potentially endogenous, because households may respond to cross-state differences in taxes and welfare benefits by migrating from one state to another.\textsuperscript{10} However, a series of recent papers using careful econometric analyses find that taxes have no or little impact on migration (Conway and Rork 2006 and 2012, Young and Varner 2011, and Thompson 2011) and there is no robustly significant evidence of welfare-induced migration (McKinnish 2007). A recent national survey also suggests that fiscal policies do not play a noticeable role in household migration decisions (Pew Research Center 2008).

There may also be some concerns of the potential endogeneity of labor supply (thereby income) in response to fiscal policies. However, previous studies (for example, Eissa and Liebman 1996, and Blau and Kahn 2007) indicate that the elasticity of hours worked in response to tax and transfer policy is relatively modest. Other papers (for example, Saez 2010, Chetty et al. 2011, and Kleven and Waseem 2013) show that even bunching at kink points or notches created by tax policy and transfer programs is smaller than theory predicts, perhaps due to limited information or policy salience. These past findings suggest that this source of endogeneity is unlikely to be particularly problematic.

\textsuperscript{10} Thompson (2011) points out that cross-state migration is much less common than perceived by many people. In any given year, only 3 percent of people make a cross-state move for any reason.
5. Data

We obtain revenue and expenditure data for 50 states and Washington, DC from the U.S. Census Bureau’s Annual Survey of State and Local Government Finances from 1980 to 2013. We use combined state and local revenue or expenditure categories as dependent variables, since combined state and local data are more comparable across states than state-only or local-only data. This is because different states choose to divide tax authority and service responsibilities between state and local governments differently. Consequently, using combined state and local data allows us to provide a more comprehensive view of subnational fiscal sustainability than using state-only or local-only data. If these were examined separately, some state governments might appear to be more fiscally sustainable than others simply because they choose to shift more service responsibilities to localities or provide less state aid, putting local governments under greater fiscal stress. In addition, we avoid double counting state aid to local governments, which is regarded as both state expenditure and local revenue at the same time.

We examine all categories of state and local revenues and expenditures, which, taken together, are far broader than general funds. The revenue side includes three categories—tax revenue, other own-source revenue, and federal revenue transfers.\textsuperscript{11} We group tax revenue into one category to get around the fact that states choose to use different tax vehicles, even though they may have similar underlying ability to raise revenues. For example, nine states (Alaska, Florida, Nevada, New Hampshire, South Dakota, Tennessee, Texas, Washington, and Wyoming) do not levy a broad-based personal income tax, while five states (Alaska, Delaware, Montana,

\textsuperscript{11} The other own-source revenue category includes current charges, miscellaneous revenues, utility and liquor store revenue, and revenue of unemployment compensation and workers’ compensation systems. It does not include proceeds from borrowing and transfers from agencies or funds of the same government such as rainy day funds, according to the Census Bureau’s Government Finance and Employment Classification Manual. It also excludes employee contributions to public employee retirement systems, since employee contributions are intended for paying employees’ own share of the normal cost. On average, current charges and miscellaneous revenues make up about 72 percent of the other own-source revenue, while other categories are relatively small.
New Hampshire, and Oregon) do not have a general sales tax. Among the three revenue categories, tax revenues are the largest revenue source, comprising slightly over half of aggregate state and local revenues during the sample period.

We examine state and local non-pension and non-OPEB expenditures by their functions, because the relationship between expenditure and its determinants may vary by function. These functions include education, social services and income maintenance (SSIM), public safety, transportation, environment and housing, government administration, and other expenditures. Education and SSIM are the two largest functions, comprising 31 and 22 percent, respectively, of the non-pension and non-OPEB expenditures.

We use ARCs as a measure of the long-term retirement costs of state and local governments. The GASB defines ARC as the amount of funding required of government employers to pay the employers’ share of the annual normal cost and to amortize the unfunded accrued liability within no more than 30 years. The normal cost is the present value of the

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12 Each function includes both its current operations and capital outlays (if any). We must include capital outlays, by definition of state and local fiscal sustainability. Chapman (2008) emphasizes that a fiscally sustainable government must consistently provide “the service and capital levels that the public demands” (p. 115). Nonetheless, including capital outlays may present two potential issues. First, they may be procyclical and therefore lumpy, if governments wait until boom years to make those expenditures. This is largely accounted for by including year fixed effects in the regressions. We then exclude the year fixed effects estimates in the prediction for trend expenditure in order to remove the short-run business cycle influences on expenditures. Second, some types of capital outlays may be viewed as fiscal investments that make future expenditures more efficient. For example, building a new school may yield savings on building maintenance in future years. As long as states do not experience vastly different cost savings schedules from capital outlays, then the year fixed effects and state-specific trends should largely account for this. In addition, what types of capital outlays should be considered fiscal investments is debatable and lacks a clear consensus.

13 The SSIM function includes expenditures on public welfare programs, hospitals, health, and social insurance administration (excluding unemployment insurance and workers’ compensation). While the Census Bureau’s government finance data do not have a Medicaid category, medical vendor payments, which are closely related to Medicaid spending, have played a major role in SSIM expenditures growth in the past three decades. In 1980, about 25 percent of SSIM expenditures were due to medical vendor payments. In 2013, those payments comprised 61 percent of SSIM expenditures.

14 The other expenditures category includes interest on general debt, other direct general expenditure, intergovernmental expenditure, utility and liquor store expenditure, as well as expenditures of unemployment compensation and workers’ compensation systems. It excludes the distribution of cash benefits and withdrawals from public employee retirement systems.
projected retirement benefits that workers earn in the current year. ARCs are generally considered to be the amount that state and local governments should contribute to the public retirement plans each year to ensure that these plans can be sustained in the long run. However, recent surveys reveal that on average, state and local governments paid only 86 percent of the pension ARCs from 2001 to 2010 and 34 percent of the OPEB ARCs from 2008 to 2010 (Pew Center on the States 2010 and 2011).

While they are often higher than actual government contributions, ARCs still represent a conservative estimate of the true long-term retirement costs of state and local governments. That is because governments often choose a higher discount rate than they should to artificially lower their pension liabilities and ARCs. Novy-Marx and Rauh (2009) argue that pension liabilities should be discounted with a risk-free interest rate, because pension benefits are legally protected and therefore considered to be risk-free for public employees. But in reality, public pension plans widely use an 8 or 8.5 percent discount rate, which is much higher than the risk-free Treasury rate, which usually ranges from 4 to 5 percent (Munnell et al. 2011, State Budget Crisis Task Force 2012).

We use the most comprehensive ARC data by state to date, obtained from the Pew Center on the States. The period covered by the data is relatively short with 2001–2013 for pension ARC data and 2008–2013 for OPEB ARC data. The data include 231 pension plans and 159 OPEB plans, which are the largest, mostly state-administered retirement plans in each of the 50 states. The data have little coverage of locally administered data and therefore underreport

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15 The State Budget Crisis Task Force (2012) reports that in 43 states the constitution or statutes guarantee public pension benefits. In comparison, OPEB are often not considered to be as legally binding as pension benefits, because OPEB are contractual in nature and therefore employers may adjust them in a relatively short period. However, a recent California Superior Court decision suggests that state and local governments may not have the flexibility in adjusting OPEB that they previously assumed (Fitch Ratings 2013).
ARCs. According to the Census Bureau’s 2013 Survey of Public Pensions, there are 3,761 locally administered public pension plans, which are often more severely underfunded than state-administered plans.

6. Regression Results

Table 1 shows the results from estimating the revenue equations. First, it confirms that personal income positively and significantly determines tax revenue and other own-source revenue. Because both revenue variables and personal income are stated in logarithms, we can interpret the coefficients as income elasticities. On average, a 1 percent increase in personal income is associated with a 1.4 percent increase in state and local tax revenue, although this elasticity is not statistically significantly different from 1. Other own-source revenue is less income-elastic than tax revenue. On average, a 1 percent increase in personal income is associated with only a 0.5 percent increase in other own-source revenue. This elasticity differs significantly from 1 at the 5 percent level.

Second, personal income and the unemployment rate are both positively related to the distribution of federal revenue transfers. The results could reflect the fact that higher-income states tend to be more generous in offering Medicaid and therefore receive more federal support; states would receive more Medicaid funding from the federal government when the unemployment rate increases driving up the Medicaid caseload. Although neither income nor the unemployment rate are statistically significant when standard errors are clustered by state, we use the regression results to remove the short-term, cyclical influences on federal revenue transfers, in the same way we remove the short-term, cyclical influences on tax revenue and other own-source revenue in the next section.
Table 2 shows the results from estimating the expenditure equations. First, it indicates that personal income and federal revenue transfers are important determinants of state and local expenditures. They are positive and statistically significant for almost all expenditure categories. This finding is consistent with the fact that wealthier states and states receiving larger federal transfers have more resources to pay for public services.

Second, the results show that states with a higher unemployment rate need to spend more on most public services. This is likely because the unemployment rate is associated with the caseload for Medicaid, public safety, low-income housing, and other public assistance. For example, more people could qualify and apply for public health care and public housing when they become unemployed.

In addition, there are noticeable differences in the estimated coefficients on the same explanatory variables across expenditure categories. For example, the income coefficients for education and SSIM are statistically significantly less than 1. This suggests that these services are income inelastic and may be considered necessary goods by residents relative to other public services.

Because the sample period includes FY 2008–2010, one may be concerned that the Great Recession could have a significant impact on the regression results. However, when we ran the same regressions using data only from FY 1980 to FY 2007, the results are similar to the ones based on the longer data series. This is not surprising given that the regressions we use are intended to reveal the underlying long-term economic processes. Therefore, we use the original regression results for the rest parts of the paper.

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16 One may be concerned that federal revenue transfers could be endogenous because some of them are matching grants. We address this concern in two ways. First, we tried dropping federal revenue transfers from the expenditure regressions. This barely affected other coefficients and the estimated trend gaps. Second, we tried using one-year or three-year lag of federal revenue transfers as an instrumental variable to the current-year federal revenue transfers, because federal grants tend to be sticky. The results are qualitatively similar to previous ones.
We do not run a regression for pension and OPEB ARCs, for which data are only available for a relatively short period. We take them as given because the size of ARCs is largely a result of previous decisions on employer contributions and benefits generosity.\(^{17}\)


Following the conceptual framework, we estimate equations (8) and (9), each state’s trend revenue and expenditure in each year, using the regression results and remove the cyclical component from government budget series using a high-employment budget approach.\(^ {18}\) Specifically, we use the regression coefficients (including state fixed effects and state-specific trends, but excluding year fixed effects because they contain a large cyclical component) and the adjusted values for variables that would have prevailed had the economy’s unemployment rate not been affected by cyclical factors.\(^ {19}\)

We replace the value of the unemployment rate with an estimated natural rate of unemployment (NRU) for each state in each year. The NRU is defined as the unemployment rate that arises from sources other than fluctuations in demand associated with the business cycles. It thus corresponds to so-called “full employment” when labor and resource markets are operating in long-run equilibrium. While the Congressional Budget Office (CBO) estimates the national NRU, there is no official estimate of state-level NRU. We assume that the ratio of the NRU to the actual unemployment rate is uniformly distributed across the country. Therefore, we multiply

\(^{17}\) We acknowledge that ARCs also depend partly on the history of portfolio returns, which are affected by business cycles. Retirement plans’ assets often depreciate in recession years due to bad financial performance, which raises the unfunded liabilities and ARCs. However, retirement plans reduce the cyclical influence on ARCs by smoothing out the actuarial value of their assets over three to five years.

\(^{18}\) We also find that our results are robust to using a standard Hodrick-Prescott filter to remove cyclical pressures as opposed to our high-employment budget approach. However, we present the high-employment budget approach, as we find its economic interpretation more appealing.

\(^{19}\) Similar uses of the high-employment budget approach can be found in previous studies such as Knight, Kusko, and Rubin (2003). However, these papers use aggregate data and focus on studying the cyclicality of the data, while we use disaggregate data and focus on the trends.
each state’s unemployment rate by the ratio of the CBO-estimated national NRU to the national unemployment rate to obtain an estimate of each state’s NRU in each year.

We then replace the value of personal income with the so-called “trend income” of each state under full employment in each year. We first model each state’s personal income as a function of the state unemployment rate, state-specific time trends, and year and state fixed effects (Table 3). We then estimate each state’s trend income based on this regression model, after replacing the value of the unemployment rate with the estimated state-level NRU and excluding year fixed effects.

Next, we estimate each state’s trend revenue and expenditure based on the regression results (Tables 1 and 2), the estimated state-level NRU, and trend income, while omitting the year fixed effects.\textsuperscript{20} We further express the nationwide trend gap as a percentage of the CBO-estimated potential GDP to take account of a growing economy. Potential GDP is defined as the maximum sustainable level of economic output without raising inflation; in other words, potential GDP is the total output level when the economy is operating under full employment. We use potential GDP instead of actual GDP as the denominator, because potential GDP is much less influenced by the business cycle than actual GDP. The national trend gap relative to actual GDP could increase during recessions simply because actual GDP declines.

As Figure 1 shows, the trend gap is much smoother and less responsive to the business cycle than the actual gap. More important, the nationwide trend gap as a percentage of potential GDP was on an increasing path during the past three decades, even without considering pension

\textsuperscript{20} When estimating trend expenditure, we substitute the estimated trend federal revenue transfers for the actual federal revenue transfers.
and OPEB ARCs. The full trend gap, including pension and OPEB ARCs, reached 1.32 percent of potential GDP, or about $660 per capita (measured in 2010 dollars) in 2013.\textsuperscript{21}

8. Sources of the Growth in the Trend Gap

Trend gap increases because trend expenditure outgrows trend revenue. However, we cannot pinpoint what portion of the trend gap is attributable to each expenditure function, because it is impossible to know what portion of trend revenue should be allocated to each expenditure function. Instead, we can examine indirectly which expenditure functions are most responsible for the increase in the trend gap.

As Figure 2 shows, more than half of the non-pension and non-OPEB subcategories of nationwide trend expenditure have grown faster than trend revenue in the last three decades. The 1980–2013 total growth rate of trend revenue is about 98 percent with the subcategory of tax revenue having an even lower growth rate of 85 percent. On the other hand, trend expenditures for public safety and SSIM exhibit the highest 1980–2013 growth rate of around 160 percent. The rapid growth of public safety expenditures is likely correlated with the rise in incarceration rates due to drug-related crimes during the 1980s and 1990s.\textsuperscript{22} The similarly fast-paced growth rate of SSIM expenditures likely reflects shifting demographics and a rise in the cost of medical care over the past decades.

A faster growth rate of an expenditure (revenue) subcategory does not necessarily mean that it plays a larger role in the overall growth of trend expenditure (revenue). That is because

\textsuperscript{21} We also observe a growing trend in about 30 states’ trend gap. With both a large per capita trend gap and a large population, California and Illinois are the two largest contributors of the FY 2013 nationwide trend gap. As noted in Footnote 8, however, the state-level analysis should be interpreted with caution. To test the degree to which these two states drive the regression results, we tried dropping California and Illinois and then reran the regressions. We found that the estimated coefficients were barely affected.

\textsuperscript{22} The Bureau of Justice Statistics National Prisoner Statistics Program suggests that the rate of sentenced prisoners per 100,000 residents rose from 139 in 1980 to 500 in 2010.
that subcategory may make up only a small share of the total trend expenditure (revenue). Thus, we calculate the contribution of each expenditure (revenue) subcategory to the 1980–2013 total growth rate of nationwide trend non-pension and non-OPEB expenditure (revenue) by multiplying the 1980–2013 total growth rate of each subcategory with its share in the 1980 nationwide trend non-pension and non-OPEB expenditure (revenue).

As Figure 3 shows, education and SSIM are the two major forces behind the rapid growth of nationwide trend non-pension and non-OPEB expenditure, contributing over half of the overall growth. This reflects both a significantly large portion of trend non-pension and non-OPEB expenditure in education and SSIM and the fast growth rate of these two subcategories, especially SSIM, during this period. Even though trend expenditure for public safety has the highest growth rate in 1980–2013, it is only the fourth largest contributor to the growth of overall trend non-pension and non-OPEB expenditure due to its relatively small size.

Pension ARCs have also been growing fast and are increasingly important in driving up the full trend expenditure and gap. Pension ARCs grew 138 percent from 2001 to 2013 (the period with available data), compared with the growth rate of 28 percent for trend revenue and 31 percent for trend non-pension and non-OPEB expenditure over the same period. OPEB ARCs first increased and then decreased to close to the initial level in the short 2008–2013 period (the period with available data). Many experts expect OPEB ARCs to increase in the near future, as more unfunded OPEB liabilities are likely to be revealed through careful actuarial examinations of many OPEB plans.


We project trend revenue and expenditure into the future using the regression models. First, we estimate state-level NRU measures as an input for the forecasting. We use the same
methodology we used for the 1980–2013 period to estimate state-level NRU measures for 2014–2015, given that data are available through 2015 for state and national annual unemployment rates and national NRU. Then, we assume that the state-level NRU will change at the same rate each year as the CBO-estimated national NRU for years 2016–2026. Second, we forecast each state’s trend income for years 2014–2026, using the regression results for personal income (Table 3) and the forecasted values of state-level NRU. Third, we assume that ARC amounts in FY 2014–2026 remain constant at their 2013 level.23 Figure 4 shows that the nationwide trend gap will likely continue to grow in the next decade. We estimate that it will rise to 1.74 percent of potential GDP in 2026, barring any changes to current policy.

10. Conclusion

This paper develops and estimates a new measure of state and local fiscal sustainability called the trend gap. Differing from the GAO studies, this paper finds that the nationwide trend gap has grown over the past three decades. Education and SSIM have played a major role in the growth of the trend gap. While pension ARCs are still relatively small compared with other expenditure categories, they are becoming increasingly important in driving up the trend gap. Our forecasts show that the trend gap continues to grow through 2026 in the absence of policy changes.

Bringing state and local governments back to a more sustainable path would likely require reforms in both revenue and expenditure systems. On the revenue side, state and local governments may consider broadening tax bases and raising tax rates to increase revenues. First, they may expand the sales tax base to include more services. The current sales tax base is largely

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23 We tried an alternative assumption that pension ARCs and OPEB ARCs will grow at the same yearly rate as they did in the 2001–2013 period and in the 2008–2013 period, respectively. We found that under this alternative assumption, the full trend gap is expected to grow to 2.38 percent of potential GDP in 2026, even larger than the gap presented in Figure 4. We prefer the trend in Figure 4 as more conservative estimate of the future trend gap.
centered on physical goods and has experienced serious erosion due to the continuous expansion of the service economy. Second, more states and localities may consider collecting sales and use taxes on goods and services sold over the internet. If the Congress were to pass the Marketplace Fairness Act, it would make collecting these foregone revenues easier for state and local governments. In addition, states might consider raising personal income tax rates and making them more progressive to increase revenue growth potential.

While enacting major tax reforms is politically difficult, it is not impossible given some states’ past experiences. For example, in the early 1990s, Connecticut adopted a personal income tax and California enacted a large state tax increase to address fiscal crises. In 2009, California and New York enacted large tax increases to deal with the Great Recession.

On the expenditure side, our analysis suggests that reforms in Medicaid, pensions, and OPEB could potentially generate large savings. In terms of Medicaid, a growing number of states have replaced the traditional fee-for-service model with managed care to serve the Medicaid population. Under managed care, states pay a fixed annual fee for each Medicaid enrollee to contracted managed care organizations, which utilize their own networks of doctors and hospitals. States have also been pushing for more integration of physical health, psychological and behavioral health, and long-term care of the Medicaid population all under managed care to further cut health care expenses. These reforms are reported to have helped states such as New Jersey and New York to contain Medicaid growth in recent years (State Budget Crisis Task Force 2012).

In terms of public pensions, the 2011 Rhode Island pension reform is widely regarded as a successful model for states and localities to address their large unfunded pension liabilities. First, the reform changed the plan structure from a traditional defined-benefit plan to a hybrid
plan with a small defined-benefit component and a defined-contribution component. In doing so, it reduces the risk of large future liabilities to the state. Second, the state suspended automatic annual increases in pension benefits and instead committed to giving retirees cost of living adjustments once every four years until the funded ratio of the state pension plan reaches 80 percent. Third, the law raised the retirement age of non-vested workers and all new hires to match the age eligible to claim full social security benefits.

States have also recently implemented several approaches to addressing large unfunded OPEB liabilities. First, an increasing number of states, such as Michigan, North Carolina, and Virginia, began to switch from using the traditional pay-as-you-go method to pre-funding an OPEB trust fund. Second, West Virginia raised retiree contributions, resulting in a 50 percent reduction in OPEB liability (State Budget Crisis Task Force 2012). Third, North Carolina increased eligibility requirements for retirees. In addition, Michigan capped retiree health care benefits.
References


Reid, Tim. 2012. “San Bernadino, California, Files for Bankruptcy with Over $1 Billion in Debts.” Reuters, August 2.


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Source: Authors’ calculations.

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by state and presented in parentheses. All revenue categories and personal income are in real, per capita terms.
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Source: Authors’ calculations.
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Source: Authors' calculations.

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered by state and presented in parentheses. Personal income is in real, per capita terms.
Figure 1. Fiscal Gap
Trend vs Actual

Percent of potential GDP vs Fiscal year

Source: Authors’ calculations, the Congressional Budget Office, and the U.S. Census Bureau’s Annual Survey of State and Local Government Finances, and the Pew Center on the States.
Figure 2. The 1980–2013 Total Growth Rate of Nationwide Trend Revenue and Expenditure

Source: Authors' calculations.
Note: Trend expenditure does not include pension or OPEB ARCs.
Figure 3. Contributions to the 1980-2013 Growth Rate of Nationwide Trend Revenue and Expenditure by Subcategory (ordered by the size of contributions)

Source: Authors’ calculations.
Note: Figures are weighted by the share of revenue or expenditure subcategories in 1980. Trend expenditure does not include pension or OPEB ARCs.
Figure 4. Trend Gap
Forecast Period: 2014-2026

Source: Authors’ calculations, the Congressional Budget Office, and the Pew Center on the States.
Note: Figures are U.S. population-weighted average. Pension and OPEB ARC's for FY2014-FY2026 are assumed to be at the FY2013 level.