NBER WORKING PAPER SERIES

TRENDS AND DEVIATIONS IN FEDERAL, STATE AND LOCAL FINANCE

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Working Paper No. 2063

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
November 1986

The project in State and Local Government Finance of the National Bureau of Economic Research graciously supported the research presented in this paper. Mary-Margaret Meagher assisted, indispensably, with the empirical analysis. Harvey Rosen and Douglas Holtz-Eakin have been generous with constructive comments. Only I am responsible for the content. The research reported here is part of the NBER's research program in Taxation. Any opinions expressed are those of the author and not those of the National Bureau of Economic Research.

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ABSTRACT

This paper contains a descriptive analysis of real per capita annual revenues, expenditures, deficits, debt levels and capital expenditures for federal, state and local government finance in the United States for the years 1952-83. It summarizes each time series as a deterministic trend and an ARIMA characterisation of the deviations around trend. These summaries demonstrate that civilian capital outlays are falling at an accelerating pace in all levels of government; federal government expenditures and debt are expanding at an accelerating rate; local special districts are also growing quadratically; state governments have a continuing surplus of revenues over expenditures; and local governments depend upon intergovernmental revenues to maintain balance between revenues and expenditures while reducing debt. Stochastic persistence tends to increase at more disaggregate levels of government. Expenditures tend to have longer lags than do revenues.

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I. Introduction

This paper contains a descriptive analysis of government finance in the United States for the years 1952-83. It concentrates on three general aspects of finance; annual revenues, expenditures and deficits; annual debt changes; and annual capital expenditures. It discusses each aspect for federal, aggregate state and aggregate local governments. This paper bases its description on time series data published by the U. S. Census Bureau, adjusted to 1972 per capita dollars. It decomposes the time series representing each aspect of government finance, for each level of government, into a deterministic trend and an ARIMA characterisation of the deviations around trend. It describes these components in terms of their implications for four issues of public policy; fiscal policy, election cycles in government finance, fiscal federalism and 'crises' in government finance.

This paper serves several purposes. First, it completes the historical presentation of government finances begun by Fabricant and Copeland. While these studies concentrated on constructing consistent raw data for the first half of this century, this uses statistical techniques to summarize more recent published statistics.

Second, it brings a new perspective, through these statistical techniques, to issues which have been addressed elsewhere. For example, Gold

presents a discussion and description of state finances in the years 1949-81. Mills presents a description of recent federal budgets. Mieszkowski and Stein provide a simple causal analysis of aggregate annual state and local expenditures, in the years 1929-82, through simulation of demand for local public services. Inman, again through simulation, analyzes changes in finance for forty large city governments between 1970 and 1980. This paper describes concisely the recent history of finance at all levels of government by extracting statistical trends from aggregate time-series data.

Third, it describes stochastic properties of government finance. Holtz-Eakin describes these properties in detail for a sample of municipalities. This paper presents them in a consistent format for all levels of government. These properties, as shown by Ashenfelter and Card, can serve as persuasive tests between alternative theories of dynamic behavior. Unfortunately, no dynamic theory of government finance exists. The stochastic results here, like those of Holtz-Eakin, are dynamic characterizations with which any intertemporal theory of government finance should be consistent.

The descriptions of government finance in this paper reveal several general observations. State and local governments are trending towards persistent real per capita surpluses, while the federal government trends towards persistent deficit. Similarly, real per capita debt is trending downwards in state and local governments, and upwards for the federal government. Real per capita capital expenditures are trending downwards at all levels of government, with the exception of capital

outlays for defense. Stochastic persistence of shocks to government finance is greater at lower than at higher levels of government.

These descriptions have several implications. The federal government can potentially exercise effective fiscal policy on aggregate demand, because the magnitudes of potential unanticipated shocks to federal deficits are large relative to the magnitudes of GNP deviations from trend. Differences between Federal and state revenues and deficits become significantly more negative in years which precede a presidential election. Trends in government finance reveal few, if any, tendencies towards devolution of government responsibilities from federal to state and local levels, despite persistent support for 'fiscal federalism' from politicians of many ideological traditions.

II. Data and Method

The Bureau of the Census collects, through their annual Survey of Governments and their quinquennial Census of Governments detailed statistics of government finance. Its publications [1] report the time series analyzed here; total revenues and expenditures, long-term debt outstanding and total capital outlays. This paper occasionally discusses components of these broad measures, taken from the same sources.

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[1] Citations are in the references at the end of this paper.

These series are consistent and complete across time and levels of government. Their principle defect, as discussed by Gold and Skaperdas, is that they do not distinguish between mandatory and discretionary elements of finance. This is not an important problem for the descriptive presentation in this paper. However, some of the most interesting trends discussed below identify divergences in growth rates across levels of government. The distinction between mandatory and discretionary changes will be important to analytical work devoted to explaining these divergences.

All time series are in real per capita terms. Federal time series are deflated by the aggregate implicit price deflator for federal purchases of goods and services. All state and local time series are deflated by the aggregate implicit price deflator for state and local purchases. [2] All data are deflated by U.S. population levels in the appropriate year.

The 'trends' referred to throughout this paper are OLS regressions of government finance variables on a constant, a trend and a squared trend term. In the vocabulary of this paper, 'linear trends' are series for which the coefficient on the quadratic term is insignificant or negligible. 'Quadratic trends' are series for which the quadratic term is significant and the linear term is of the same sign, insignificant, or negligible of opposite sign. Positive quadratic terms represent accelerating growth, negative terms represent accelerating shrinkage. For regressions in which linear and quadratic terms are of opposing sign,

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[2] These deflators are published in the National Income and Product Accounts.

'years to extremum' represents the number of years for which the derivative of the trend equation with respect to time is equal to zero. The 'deviation' time series for each government finance variable -- the residuals from the trend regression -- are summarized below as autoregressive-integrated-moving average (ARIMA) models.

III. Revenues, Expenditures and Deficits

The discussion in this section analyzes federal, aggregate state and aggregate local expenditures and revenues. Trends for the federal government suggest that expenditures are outgrowing revenues at an accelerating pace. In contrast, state revenues are outgrowing expenditures at an accelerated rate on all but the most general definitions. Total local revenues, in particular those of special districts, are outgrowing expenditures at an accelerated rate, but largely on the strength of intergovernmental transfers. Federal government deviations from trend exhibit the least stochastic persistence, local government deviations exhibit the most. Expenditure deviations are more persistent than those of revenues.

A. Trends

Tables 1, 2 and 3 present the trends in government revenues and expendi-

tures for federal, aggregate state and aggregate local governments, respectively. Each table presents results for revenues, expenditures, and their difference. [3] These trend estimates suggest that real per capita 'growth' in government is correlated with the level of government. Federal government expenditures and excesses of expenditures over revenues are growing at quadratic rates. State government expenditures are growing linearly, at most, and are increasingly exceeded by revenues. Local government expenditures are growing at decelerating rates, and are now, or will soon be increasingly exceeded by revenues.

1. Federal Finances

The coefficients in table 1 yield one general observation with regard to trends in real per capita federal finance: the federal government is growing at an accelerating rate. Federal total revenues and expenditures have significant positive quadratic terms. The trend difference between them is also expanding, with expenditures exceeding revenues, at an accelerating rate.

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[3] The 'differences' referred to in these tables are the algebraic differences between revenue and expenditure time series. Positive values represent excesses of revenues over expenditures, negative values represent the opposite relationship. The constant and trend coefficients in the 'difference' equations are, by construction, identical to the differences between constants and coefficients in the corresponding revenue and expenditure equations. These differences may not be consistent with accounting definitions of 'deficits' or 'surpluses'.

Table 1.

Trend Coefficients in
Federal Finance, 1952-83

	Constant	Trend	Trend Squared	R^2	Years to Extremum	Residual Standard Error
Total Revenue	880.	3.96	.357	.852	-	64.7
	(24.1)	(.774)	(2.38)			
Total Expenditure	901.	-.421	.702	.954	.3	50.2
	(31.8)	(.106)	(6.03)			
Difference	-21.5	4.38	-.345	.645	6.3	54.5
	(.699)	(1.02)	(2.73)			
Difference, Total General Revenue and Expenditure	-21.8	2.68	-.211	.437	6.4	50.9
	(.760)	(.666)	(1.78)			
Difference, Direct General Revenue and Expenditure	-21.6	10.8	-.249	.228	21.7	58.8
	(.650)	(2.32)	(1.82)			

Notes: T-statistics are in parentheses.

Though these trends fit the totals well, as demonstrated by their R^2, broad categories of federal activity have very different histories. The total trends depend on strong trends in revenues and expenditures from federal trust funds (largely the Old Age, Survivors, Disability, and Health Insurance (OASDHI) trust), and in transfers to lower levels of government. Quadratic trends for total general revenues and expenditures -- measures which exclude the trusts [4] -- achieve R^2's of only .45 and .79, respectively. Direct general expenditures exclude the large amounts

[4] Total general revenues and expenditures also exclude utility and liquor store transactions. These are much more important for state and local governments than for the federal government.

of federal transfers to lower governments, as well as the trust transactions. A quadratic trend for these expenditures, on federally-provided services such as national defence, national parks and federal highways, achieves an R^2's of only .38 . [5]

These comparisons imply that trust funds and intergovernmental transfers may play a distinctive role in the growing excess of total expenditure over total revenues. The trend difference between total general revenues and expenditures, as given in table 1, is similar to that in the total difference, but has less explanatory power. The trend difference between direct general revenues and expenditures has even less explanatory power, but its coefficients are significant. They estimate that these revenues have exceeded expenditures for most of the sample period. However, the excess is shrinking at an accelerating rate. They also predict that Federal direct general expenditures will begin to exceed direct general expenditures in the early 1990's.

In general, trends predict poorly the differences between federal revenues and expenditures. However, the large federal deficits of 1983, 1984 and 1985 are surprisingly consistent with estimated trends. [6] These trends underestimate the actual difference in 1983. [7] Of all the sample

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[5] Direct, or own-source, general revenues include only a small quantity of intergovernmental revenues. Their trends are similar to those in total general revenues.

[6] The estimated quadratic trends for the differences between total revenues and total expenditures, and between total general revenues and total general expenditures, are always and increasingly negative.

[7] 1983 is the most recent year in the sample used here.

years, the absolute prediction error for total and total general differences in 1983 is greatest. However, the relative prediction error is small, only 34.5% of the actual difference. Furthermore, differences in more recent years will probably lie closer to the trends. Real per capita deficits have fallen, and the trends predict increasingly negative differences. [8]

Trends in detailed components of federal revenues and expenditures reveal shifts in federal activity. [9] Among own-source revenues, total real taxes per capita exhibit no trend at all. [10] Income taxes have a linear upward trend significant at 10%. In contrast, revenues from some current charges are growing at quadratic rates. Interest earnings are also growing at quadratic rates, but so are interest payments. Trends in net interest earnings are negative throughout the sample period, and increasingly so.

Trends in components of federal expenditures provide even more dramatic contrasts. Expenditures for administration (general control and financial administration), 'law and order' (police protection and cor-

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[8] The Economic Report of the President, 1986 reports federal deficits in current dollars of $207.8 billion in 1983, $185.3 in 1984, $212.3 billion in 1985, estimated $202.8 billion in 1986 and estimated $143.6 billion in 1987 (Table B-73). With modest inflation and population growth, real per capita deficits in these years would not exceed that of 1983.

[9] The Census Bureau publishes data for detailed federal components beginning in 1958. Trend estimates for these series and for all series not reported in full are available from the author.

[10] R^2=.07 for the regression of real taxes per capita on a constant, trend and trend squared. The constant in this equation is equal to $618, significant at 5%.

rection) and public welfare (categorical and other cash assistance, and other welfare expenditures) all follow trends with significant positive quadratic terms. However, expenditures for all forms of transportation (including highways) are falling at quadratic rates. Expenditures on health are either growing linearly (hospitals) or at a decelerating pace (health and social insurance administration). Expenditures on national defense and international relations are also growing linearly. Expenditures on eduction, for the most part, have not trended significantly.

2. State Finances

Trends in aggregate state real per capita revenues and expenditures, presented in table 2, embody distinct contrasts to federal trends. These trends predict state finances -- again as measured by R^2 -- much better than they do federal finances. Generally, they demonstrate that growth in state governments is entirely linear. The few significant quadratic trends all indicate decelerating growth in expenditures, and accelerating excesses of revenues over expenditures.

Specifically, the difference between total state revenues and total state expenditures is negligible, and displays no trend. Neglecting insurance trusts, utilities and liquor stores, the trend difference between total general revenue and total general expenditures has been increasingly positive since approximately 1976, the eighteenth year of

Table 2.

Trend Coefficients in
State Finance, 1952-83

	Constant	Trend	Trend Squared	R^2	Years to Extremum	Residual Standard Error
Difference, Total Revenue and Expenditure	2.92 (.324)	-.140 (.111)	.0500 (1.35)	.476	1.4	15.9
Total General Revenue	201. (12.7)	9.55 (4.32)	.0723 (1.11)	.945	-	28.0
Total General Expenditure	152. (12.4)	15.5 (9.03)	-.0889 (1.76)	.969	87.2	21.7
Difference	49.1 (6.36)	-5.92 (5.49)	.161 (5.08)	.518	18.4	13.7
Difference, Direct General Revenue and Expenditure	29.3 (5.85)	-.729 (1.04)	.0615 (2.99)	.701	5.9	8.85

Notes: T-statistics are in parentheses.

the series. [11] Own-source general revenue has always exceeded direct general expenditures, by increasing amounts since about 1958, the sixth year of the series. [12]

Trends in components of state finance demonstrate striking com-

[11] This difference was negative between years 13 and 24 of the series, or approximately between 1965 and 1976. The largest deficit occurred in year 18, or approximately 1970.

[12] The National Income and Product Accounts confirm the recent fiscal strength of state and local governments. They report a record nominal surplus for combined state and local governments in 1983, using standard measures, and a relatively large surplus when adjusted for capital and financial transactions (Levin).

parisons to those in components of federal finance. The sources of state revenue growth are opposite to those of growth in federal revenues. However, federal and state allocations of expenditure growth are broadly similar.

Total state tax revenues, and general sales taxes, are growing linearly. The trend in income taxes is positive and quadratic. Net interest is also positive, and growing. Charges are growing along a decelerating trend which predicts an end to growth in approximately a decade. The trends in motor fuel and motor vehicle tax revenues have been falling for nearly twenty years.

State expenditures on general control and financial administration, and all forms of public welfare display significant positive quadratic trends. Expenditures for police and correction are growing linearly. Expenditures for hospitals and health expenditures are also growing, more vigorously than at the federal level. State expenditures on all forms of transportation peaked in the last decade, and are now declining. State education expenditures, which are growing on a trend that is set to peak in the next decade, are the only expenditure component for which the current state trend is noticeably at odds with the federal trend.

3. Local Finances

Table 3.

Trend Coefficients in
Local Finance, 1952-83

	Constant	Trend	Trend Squared	R^2	Years to Extremum	Residual Standard Error
All Local Governments:						
Difference, Total Revenues and Expenditure	-18.3 (3.97)	-.445 (.691)	.0380 (2.01)	.517	5.9	8.15
Total General Revenue	248. (18.0)	10.9 (5.66)	-.0171 (.302)	.944	318.7	24.4
Total General Expenditures	218. (21.2)	16.1 (11.2)	-.189 (4.47)	.966	42.6	18.2
Difference	30.4 (4.82)	-5.24 (5.95)	.172 (6.63)	.623	15.2	11.1
Difference, Direct General Revenue and Expenditure	-64.8 (8.16)	-6.44 (5.81)	.0525 (1.61)	.914	61.3	14.0
Special Districts, 1964-1983:						
Total General Revenue	16.7 (21.0)	.352 (2.02)	.0553 (6.86)	.988	-	1.07
Direct General Expenditure	17.9 (20.2)	.529 (2.72)	.00903 (1.01)	.935	-	1.19

Notes: T-statistics are in parentheses.

Table 3 presents the trends in aggregate real per capita local government finance. In contrast to federal and state governments, the dominant

observation here is that, if anything, trends in local finance are towards shrinkage. All measures of local revenues and expenditures, with the exception of total general revenues, have significant negative quadratic trends which eventually imply reductions.

However, 'shrinkage' is, for the most part, a prediction of these trends, rather than an experience within the sample period. As given in table 3, total general revenues and expenditures have large, significantly positive linear terms. Despite the significant negative quadratic term for expenditures, these equations predict continued revenue and expenditure growth well beyond the sample period. [13]

Equations for differences, presented in table 3, indicate that local governments, in the aggregate, appear to be moving into a period of relative financial ease. This ease may be precarious, however. It depends entirely on transfers from federal and state governments. Of all local government revenue sources, these are least within the their control.

According to the estimated trend, the difference between total revenues and total expenditures has been positive and growing with increasing rapidity since approximately 1980. This may actually understate the sufficiency of total revenues. Disregarding the insignificant linear trend, the equation predicts excesses beginning as early as 1974.

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[13] Equations for total revenue, total expenditures and direct general expenditures are similar.

Trend differences between total general revenues and total general expenditures have been positive since approximately 1975, as well.

Intergovernmental revenues play an important role in these comparisons.[14] The trend difference between own-source general revenues and direct general expenditures does not include them, is negative, and growing. Accepting the insignificant quadratic term, the excess of direct general expenditures over own-source revenues will grow through the first sixty-one years of the series. Neglecting this term, the excess increases linearly. This trend indicates that own-source revenues are increasingly inadequate support for the central functions of local government.[15]

Trends in local government revenue components demonstrate these inferences explicitly. Transfers from federal to local governments are growing quadratically. Growth in state transfers is slowing but projected to continue for another 25 years. Utility revenues are also increasing at quadratic rates. However, property taxes, traditionally the most important own-source revenue, are declining. The trend in property tax revenues peaked a decade ago. In another decade the trend

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[14] Census Bureau sectoral data ignore intrasectoral transfers. For example, transfers from counties to cities -- which create identical additions to gross local intergovernmental revenues and gross local intergovernmental expenditures -- are netted out of published local intergovernmental totals.

[15] This analysis does not, of course, discriminate between two possible explanations: Intergovernmental revenues may be essential, because local resources are fundamentally inadequate. However, local governments may choose not to tap underutilized local revenue sources, because intergovernmental revenues are available.

will imply real per capita property tax revenues no greater than those of 1952. Among own-source revenues, trends in sales taxes and charges are positive.

The trends in components of local government expenditures are occasionally at variance to those in state and federal governments. As at higher levels, expenditures on health and hospitals, police and correction, general control and financial administration are increasing. However, local expenditures on all categories of welfare are decreasing, beginning approximately ten years ago. Local school and library expenditures are following a similar pattern, with the exception of expenditures on higher education. Expenditures on many purely local functions, such as fire, sanitation and sewerage, are increasing.

Of the different types of local governments, counties, municipalities, townships, special districts and school districts conform to the aggregate trends of table 3 during the years 1964-83. However, the aggregate of special districts is growing. As given in that table, both linear and quadratic trends are positive for total general revenues and direct general expenditures. [16] With the exception of the quadratic trend in expenditures, all are significant. These equations imply that the difference between special district total general revenue and direct general expenditure has been positive and growing for over

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[16] Total direct revenues for local governments include important net intergovernmental revenues. Direct general expenditures for local governments neglect only negligible net intergovernmental expenditures. Comparisons between the two are, therefore, reasonable indications of actual budget conditions.

ten years.

8. Trend Implications

These trends summarize accurately the history of government finances between 1952 and 1983. Their implications may encourage policy changes which ensure that future trends are different. In particular, transfers from the federal government are essential to the apparent 'health' of local governments, and contribute to that of state governments. In the current circumstances, federal government officials might be tempted to reduce transfers to state and local governments in order to limit or reduce federal deficits (Skaperdas).

These trends contain implications for three other policy issues. They provide a crude index of the scope for countercyclical fiscal policy; a simple test of the existence of electoral cycles in government finance; and descriptive measures of 'fiscal federalism' -- the extent to which government responsibilities and revenue sources have been reallocated across government levels.

1. Fiscal Policy

The trends estimated above provide useful indications of the scope for

Table 4.

Average Federal Real Per Capita Differences, 1952-1983

Federal Differences		
Total Revenues and Expenditurs	Total General Revenues and Expenditures	Direct General Revenues and Expenditures
-72.60	-53.16	67.40

countercyclical government fiscal policy. Table 4 presents mean differences between real per capita revenues and expenditures for the federal government during the years 1952-83, using all three 'total' concepts. These differences are quite small, in comparison to GNP. The -$72.60 per capita mean difference between federal total revenues and total expenditures, the largest, is only 1.4% of mean real per capita GNP ($5276.40) during this period. However, if the effective element of fiscal policy is unanticipated deficits, and the appropriate target is unanticipated deviations of GNP from trend (Barro), this comparison is not conclusive.

The estimates of table 1 demonstrate that a large proportion of federal deficits can be 'anticipated' merely from simple trends. Residual federal differences, net of trends, are simple approximations of 'unanticipated' deficit components. The detrended variance of government deficits, relative to the detrended variance of GNP, is a crude

approximation to the correct comparison. [17]

For the years studied here, 1952 through 1983, real per capita gross national product has a substantial trend component. R^2=.957 for a regression of real per capita gross national product on a trend and a squared trend. [18] The residual standard error of this equation, in 1972 dollars, is $195.40. As reported in table 1, the residual standard error of the difference between federal total revenues and expenditures is equal to $54.45. The standard error in this measure of the federal deficit is more than a quarter of that in detrended GNP. Reasonable unanticipated changes in federal deficits, in combination with reasonable macroeconomic multipliers, can produce deviations in GNP around trend that are relatively large.

2. Election Cycles

If macroeconomic outcomes are sensitive to government fiscal policy, incumbent politicians may be able to manipulate macroeconomic variables in order to produce circumstances favorable to reelection. Manipulations

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[17] This approximation should be taken only as illustrative. Detrended GNP and federal deficit series provide only 'upper bounds' on the 'unanticipated' components of these series. More sophisticated time series or causal models would presumably reduce the residual variances in both.

[18] The dependent variable in this equation is gross national product, deflated by implicit price deflator and U. S. population, 1952-83. The estimated equation, with t-statistics in parentheses, is

Real per capita GNP = 3759 + 89.0(trend) + .276(squared trend).
(34.1) (5.57) (.607)

of this sort would produce a political business cycle, coinciding with the chronology of government elections. Previous studies have produced conflicting theories with regard to the possibility of such cycles, as well as conflicting evidence with regard to their existence. When expanded, the simple trend analyses above demonstrate that, as an empirical matter, federal and state revenues fall relative to expenditures in years preceding federal elections.

Policy-induced business cycles could be a successful political strategy if either the electorate is myopic (Nordhaus, MacRae) or if it suffers information asymmetries under rational expectations (Rogoff and Sibert). Nordhaus and MacRae present empirical evidence that unemployment cycles coincide with federal elections. However, this strategy would be futile if fiscal policy is ineffective; McCallum presents evidence that unemployment is insensitive to election schedules. It would also be futile if the electorate does not care about macroeconomic outcomes; presidential popularity ratings appear to be insensitive to macroeconomic outcomes (Golden and Poterba).

The evidence for election cycles in macroeconomic outcomes is mixed. The existence of cycles in fiscal policy instruments is, logically, a prior question. Here, previous evidence is negative. Dummy variables for year in the federal election cycle do not contribute significantly to the explanatory power of equations for quarterly federal deficits which include other macroeconomic and political variables (Golden and Poterba). This evidence is not conclusive, because the regression specification includes the macroeconomic targets of election cycle

fiscal strategy among the explanatory variables for the election cycle fiscal instrument. In contrast, regressions which include only trends, squared trends and dummy variables for years prior to the years in which federal elections are held do not identify causality, but do provide strong evidence that federal and state fiscal deficits are sensitive to election schedules.

The impact of election cycles on federal government finances is increasing. Coefficients on a trending dummy [19] are negative, significant at 10% for the differences between total and total general revenues and expenditures, and at 5% for the difference between own-source general revenues and direct general expenditures. [20] These coefficients indicate that the year before each successive election reduces the total difference by an additional $7.44, the total general difference by $7.11, and the direct general difference by $9.72 per capita. In 1983, the eighth pre-election year in the sample period, these reductions amounted to $59.52, $56.88 and $77.76 per capita, respectively. The preelection effect on total and total general differences in that year was equivalent to the average excess of total and total general expenditures over revenues, as given in table 4. The effect on the

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[19] A trending dummy is the interaction between the standard dummy and the trend. In the year prior to a federal election year, it takes on the value of the trend. In all other years, it takes on the value of zero.

[20] The coefficients on a conventional dummy variable representing years before federal election years are negative for the differences between all three revenue and expenditure measures, but significant at 10% or less. Coefficients on both the dummy and the trending dummy are negative in revenue equations and positive in expenditure equations, but significant only in equations for the differences. Trend and squared trend coefficients are unaffected by the inclusion of either.

direct general difference more than negated the mean surplus at that level.

The preelection effect on state finances has been also been significant, but stable. Coefficients on a conventional dummy variable are negative and significant at 5% for all three difference measures. This is the only variable that has a significant effect on the difference between total revenues and expenditures. [21] These coefficients indicate that years prior to federal elections reduce state total, total general and own-source surpluses by $15.13, $11.34 and $8.98 per capita, respectively. These reductions are 82.2%, 125% and 22.9% of mean surpluses, as given in table 4.

The descriptive evidence in these regression coefficients does not demonstrate that fiscal policy actually induces political business cycles or that political business cycles are effective electoral strategy. However, it is consistent with the suggestion that incumbent politicians manipulate fiscal policy in order to improve electoral prospects. Deficits in years prior to federal elections are large for both federal and state governments. Coefficients on dummy variables for other years in the federal election cycle are uniformly insignificant. Aggregate local government finances are unaffected by the federal election cycle, presumably because individual local government elections

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[21] Again, the inclusion of either the dummy or the trending dummy leaves trend coefficients unaltered. The dummy variable also indicates a preelection year reduction in state total revenues, significant at 10%. Coefficients on the trending dummy for preelection years are negative, but significant at only 10% for the three deficit measures.

take place in all years. More appropriate measures of election chronology might reveal fiscal effects at this level, as well.

3. Fiscal Federalism

In the U. S. federal system, government services can be provided, and public revenues collected, at any of three levels. Service at any level of government depends on service provision, service mandates and supporting grants from higher levels of government (ACIR, Craig and Inman). Responsibilities and revenue sources may be shifted among federal, state and local governments for three reasons. Theoretically, changes in the publicness and congestibility of public services may change the level of government from which provision is optimal. Ideologically, 'fiscal federalism' embodies an imperative to allocate services to the most local jurisdiction practicable. Practically, and probably most compellingly, higher, general purpose jurisdictions shift responsibilities to more local or more specialized jurisdictions when they can no longer afford to support them (Copeland, pg. xxiv).

Despite changes in the technologies, ideologies and practicalities of government administration, trends in the components of federal, state and local revenues and expenditures reveal few shifts in the allocations of either across government levels. Growth within particular expenditure or revenue categories is often in the same direction at all levels of government. Changes occur in expenditure or revenue shares over time, but are more likely to derive from variations in growth rates rather

than differences in growth directions.

Intergovernmental transfers are the most obvious connection between different government levels. The revenue-sharing aspect of 'fiscal federalism' has become more important over the sample period. State intergovernmental revenues have grown at a decelerating rate, on a trend which predicts that growth will end in the year 2000. Local intergovernmental revenues are growing linearly, mainly on the strength of transfers from the federal government.

Among most important own-source revenue categories, trends are predominantly towards continued sharing among government levels, rather than unique assignments. Income tax revenues are increasing at all levels, though at quadratic rates for state governments. Charges are also increasing at all levels, though here estimated trends predict that state revenues will cease to grow after 1992. General sales tax revenues are increasing for state and local governments. [22]

The property tax is the only major own-source revenue for which revenue trends move in different directions at different levels of government. Local property tax revenues have been decreasing at a quadratic rate since approximately 1972. State property tax revenues have grown at a linear rate over the sample period. However, this contrast is not as strong as it appears. The time series of state property tax revenues is poorly explained by a trend and squared trend (R^2=.41), and

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[22] The federal government does not levy general sales taxes.

state revenues have always been small.

The contrast is more compelling for net interest revenues. They are growing for state and local governments, and falling for the federal government. Of course, these trends are the product of practical problems in government finance, not the programmatic implications of fiscal federalism.

The fiscal federalism policy implies greater specialization in services than in revenue collection. Expenditures in three major categories have been substantially reallocated. However, only the change in non-highway transportation finance is consistent with the directions dictated by this policy. Federal and state expenditures for non-highway (air and water) transportation services have been decreasing at a quadratic rate for nearly twenty years. Local expenditures are increasing at a linear rate. This shift is consistent with increased local autonomy.

In contrast, welfare and education expenditures have shifted away from local governments, and against the direction dictated by fiscal federalism. The shift in welfare expenditures is probably in the service of increased efficiency. Welfare expenditures by local governments are decreasing, while those of state and federal governments are increasing. Welfare provision at higher government levels minimizes adverse selection problems; local provision may induce client and taxpayer migrations that penalize generous jurisdictions. Federal responsibility for education is also increasing. Federal education expenditures have no trend, while state and local expenditures are trending downwards.

In all other expenditure categories, trends are in the same direction across all three levels of government. In all, expenditures on general administration, financial control, police, hospitals and health have been growing. Federal, state and local highway expenditures are trending downwards.

C. Stochastic Deviations From Trends

The trend regressions discussed above do not exhaust the explanatory power of simple, non-causal statistical models. ARIMA models summarize conveniently the dynamic properties of deviations from trends. These properties are useful in prediction, but they may be most important as the intertemporal 'facts' with which dynamic theories of government finance should be consistent.

A presentation of these facts for the purpose of testing such theories is premature, since none exist. Rather, this presentation should encourage experiments in the theoretical treatment of intertemporal public finance. There are two general themes: Stochastic persistence is inversely related to the level of government. 'Persistence' here has two meanings; dynamic structures of trend deviations in lower levels of government include more lagged terms, and lag coefficients tend to have higher values. In addition, ARIMA models for deviations from expenditure trends require more lags than do those for revenue deviations.

Table 5.

ARIMA Models for Federal, State and Local Total General Revenue and Expenditure Trend Residuals 1952-83

	Autoregression Coefficients At Lag 1	2	3	Residual S.E.	Prob Value Chi-square on Lags to 6	12
Federal:						
Total General Revenue	.466 (2.76)	-	-	50.1	.406	.505
Total General Expenditure	1.05 (6.37)	-.433 (2.62)	-	30.4	.904	.842
State:						
Total General Revenue	.874 (7.70)	-	-	15.9	.300	.265
Total General Expenditure	* .687 (3.86)	-.407 (1.87)	.399 (2.04)	7.69	.699	.564
Local:						
Total General Revenue	1.16 (6.49)	-.315 (1.72)	-	11.9	.586	.435
Total General Expenditures	* .373 (2.15)	-.355 (2.05)	.430 (2.45)	8.51	.463	.667

Notes: T-statistics are in parentheses.

Deviations from trends for federal, state and local total general revenues and expenditures conform to simple AR characterizations,

presented in table 5. [23] With the exception of federal total general revenues, these models substantially augment the predictive power of the trends regressions. They reduce residual standard errors by approximately 40-65%, in comparison to those given in tables 1 - 3 for original deviation series.

These models demonstrate that stochastic persistence is greater for revenue measures at lower than at higher levels of government. First lag coefficients increase in magnitude from federal to state to local governments. In addition, local government revenues include a second lag. Federal total general revenue deviations are an AR(1) with first lag coefficient significantly less than one. State deviations are also an AR(1). However, the first lag coefficient is greater than that of the federal series. One is just within the upper boundary of its confidence interval. [24]

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[23] ARIMA models for federal total and direct general revenues and expenditures are similar to the total general models presented here. Models of these measures for state and local governments differ from those for total general revenues and expenditures, but are nevertheless consistent with the conclusions drawn below.

Uniquely, trend deviations for virtually all individual federal revenue sources are also AR(1). Those for income taxes, other taxes and total current charges have first lag coefficients of magnitudes similar to that for total general revenue. Stochastic behaviors of individual state and local government revenue sources, and of individual expenditure categories at all levels of government, are much more heterogeneous.

[24] First differences of both these series are white noise, but have higher residual standard errors than the series reported here.

Local total revenue deviations are an AR(2). [25] The first lag coefficient in this model is greater than one, though not significantly so. [26]

First lag coefficients for total general expenditure models are equivalent across government levels. However, state and local models require two more lags than does the model for federal expenditures. Trend deviations for federal total general expenditures are an AR(2), with first lag coefficient approximately equal to one. Deviations for state and local revenues are AR(3) in first differences. These models imply a coefficient of one on the first lag in the undifferenced series. In addition, they require four lags in the undifferenced series, in contrast to the two lags of the federal model.

Regardless of government level, models for total general expenditure are more persistent than models for total general revenues. At any level, expenditure models require more lags in the original, undifferenced series than do revenue models. In addition, first lag coefficients are larger for expenditure than for revenue models in federal and

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[25] Longer lags may be a stochastic artifact of aggregation. If time series for revenues of individual local governments have their own stochastic behavior, the characteristics of these series constrain the stochastic properties of aggregate local government revenues. As an example, the sum of two AR models is an auto-regressive moving-average (ARMA) model with autoregressive order equal to the sum of the two individual autoregressive orders, and with moving average order equal to the maximum of the two (Harvey, pg. 43).

[26] This model is stable, but has complex roots; $\phi_1^2 + 4\phi_2 < 0$, where ϕ_1^2 is the coefficient on the first lag, ϕ_2 that on the second. Most AR(2) models reported here with first order coefficient of approximately one or greater, and second order coefficient negative and of smaller magnitude, have acceptable representations as ARMA(1,1). First differences are often white noise, but with higher standard errors.

state models, and of approximately equal magnitudes for local models.

Table 5 demonstrates that stochastic behavior is more persistent state finances than for federal, and for local finances than for those of states. Lag structures are typically longer for expenditure measures than for corresponding revenue measures. These differences may be the products of aggregation, differences in electoral processes, in budget practices or in the formation of expectations at each level of government. Theoretical models of these aspects of public finance can be tested, in part, by their consistency with these facts. [27]

IV. Debt and Capital Spending

Changes in government debt and capital spending are dependent on, and components of, changes in government revenues and expenditures. Nevertheless, they both represent important issues for public policy, in their own rights. These summaries demonstrate that state and local government debt burdens are falling. Real per capita government debt is growing only at the federal level. However, the adequacy of America's public infrastructure may be at risk. Real per capita non-defense capi-

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[27] The efficacy of fiscal policy and the frequency of budget crises may depend, in part, upon contrasting stochastic behavior in revenue, expenditure and GNP trend deviations. These dependencies could be explored in vector autoregressions if the relevant time series were sufficiently long. The thirty-two years analyzed here contain too few degrees of freedom to estimate such models.

tal outlays are falling at all levels of government.

A. Debt

Local government debt levels have been a popular issue of concern since the 1974 financial difficulties of New York City. Continuing concern would be misplaced, because local government real per capita debts have been falling at an accelerating pace since approximately that time. In the past decade, it might better have been directed at state debt levels, which have only recently ceased to grow. Now, however, changes in the federal real per capita debt level are, and promise to continue to be, most alarming. Real per capita 'guaranteed' debt levels are growing only for the federal government. Debt levels for counties and special districts are also growing, but probably through increases in nonguaranteed debt only.

Table 6 presents regression coefficients for trend and squared trend terms on real per capita gross long-term debt outstanding for federal, aggregate state and aggregate local governments. The contrasts between levels of debt at different levels of government are evident. Real per capita debt has been declining at an accelerating pace in local governments since approximately 1970. State debt is still growing, but should peak and then fall, beginning in approximately 2000. Federal debt reached a minimum in approximately 1980, and is now growing at an ac-

Table 6.

Trend Coefficients for Federal, State and Local Gross Long-Term Debt Outstanding, 1952-1983

	Constant	Trend	Trend Squared	R^2	Years to Extremum	Residual Standard Error
Federal	3610.	-121.	2.52	.947	24.0	99.1
	(64.4)	(15.5)	(11.0)			
State	101.	8.68	-.0908	.978	47.8	8.34
	(21.4)	(13.2)	(4.68)			
Local	312.	22.3	-.582	.892	19.2	19.3
	(28.7)	(14.7)	(13.0)			

Notes: T-statistics are in parentheses.

celerating rate.

Trends in state and local government debt levels are even less disturbing when they are disaggregated by type of debt. [28] State and local short-term debt levels have been shrinking for a decade or more. Guaranteed, or full faith and credit debt -- debt supported by a jurisdiction's general tax revenues -- in local governments began to fall at the same time. It has recently peaked for state governments. Revenue, or nonguaranteed debt -- debt backed only by the future revenues of the project it finances -- is responsible for any tendency towards growth in local government debt, and the remaining growth in that of state governments.

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[28] The Census Bureau reports only gross long-term debt outstanding for the federal government.

Table 7.

ARIMA Models for Federal, State and Local Gross Long-Term Debt 1952-83

	Moving Average Coefficients At Lag 1	Moving Average Coefficients At Lag 2	Residual S.E.	Prob Value Chi-square on Lags to 6	Prob Value Chi-square on Lags to 12
Federal	-1.18 (6.24)	-.423 (2.23)	67.6	.565	.766
State	-.752 (4.42)	-.442 (2.58)	6.53	.517	.558
Local	-1.24 (8.65)	-.634 (4.43)	11.8	.761	.451

Notes: T-statistics are in parentheses.

Table 7 presents ARIMA characterizations of deviations from debt trends. Deviations from trends in debt for all levels of government are consistent with similar second-order moving averages, MA(2). These models reduce residual standard errors by 22-39%. Most components of state and local debt are autoregressions with one or two lags, frequently representable as first differences.

The trends in table 8 demonstrate that tendencies toward growth in local government debt during the period 1964-83 are located entirely in counties and special districts. In both, debt is growing at an accelerating rate. This growth is probably not a threat to the fiscal health of special districts, as it must legally be in revenue bonds backed by dedicated revenue sources. If growth in county government debt

Table 8.

Trend Coefficients for Levels of Local Government Long-Term Debt Outstanding, 1964-1983

	Constant	Trend	Trend Squared	R^2	Years to Extremum	Residual Standard Error
Counties	51.1	.222	.0725	.906	-	3.59
	(19.1)	(.380)	(2.67)			
Municipalities	234.	-1.77	-.0346	.898	-	5.28
	(59.5)	(2.05)	(.868)			
Townships	13.9	-.244	-.00203	.874	-	.680
	(27.4)	(2.20)	(.395)			
Special Districts	117.	-2.01	.148	.718	6.8	5.25
	(29.8)	(2.34)	(3.73)			
School Districts	132.	-1.09	-.157	.990	-	2.76
	(64.2)	(2.42)	(7.52)			

Notes: T-statistics are in parentheses.

includes growth in guaranteed debt, [29] counties may encounter financial difficulties. As discussed above, their revenues are shrinking at a quadratic rate. In contrast, municipal, township and school district debt levels have fallen continuously. The decline in school district debt is accelerating.

These trends identify important changes, consistent with the themes identified by Copeland, in the allocation of responsibilities across levels of government. General-purpose local governments have, in part, recovered from the debt 'crisis' of the early 1970's by transferring debt and debt-funded projects to special districts. The increasing

[29] The Census Bureau does not report type of debt by type of local government.

burden of federal debt may eventually encourage the federal government to perform an analogous transfer; to abandon its traditional role as donor in the exchange of intergovernmental transfers, and require state and local governments to maintain services out of own-source revenues.

B. Capital Spending

Statistical descriptions of government capital spending are in distinct contrast to those of debt. Trends in debt differ across levels of government, but stochastic models of trend deviations are similar. Trends in capital outlays are similar, but dynamic behavior of trend deviations varies. The implications of these comparisons are unfavorable to capital spending. While 'crises' in debt seemed restricted to the federal government and, perhaps, counties, crises in capital formation may be endemic.

Table 9 presents trend regressions for real per capita capital outlay at various levels of government from 1952 through 1983. Total federal capital outlays are unique; they are currently growing at a quadratic rate, having reached a minimum in approximately 1977. However, this growth is entirely due to capital outlays on defense, which average 82.5% of the total. The trend in civilian federal capital outlays is identical to those in aggregate state and aggregate local outlays;

Table 9.

Trend Coefficients for Levels of Capital Outlay in Federal, State and Local Government, 1952-1982

	Constant	Trend	Trend Squared	R^2	Years to Extremum	Residual Standard Error
Federal	249.	-12.3	.246	.912	25.0	14.1
	(30.6)	(10.5)	(6.92)			
Federal Excluding Defense	14.7	1.25	-.0329	.253	19.0	5.28
	(4.84)	(2.85)	(2.48)			
State	32.8	5.16	-.159	.872	16.2	4.57
	(12.5)	(13.6)	(13.8)			
Local	70.6	2.05	-.0501	.704	20.5	3.68
	(33.4)	(6.73)	(5.41)			

Notes: T-statistics are in parentheses.

accelerated decline from a peak reached around 1970. [30]

Broadly, these trends are replicated in category-specific capital expenditures. Among federal capital expenditures, only those for highways are increasing. Utilities are the only functions of local government for which the trend in capital expenditures is significantly positive. Captial expenditures on all other functions in these governments, and on all state government functions, are now trending downward.

Table 10 presents ARIMA models for deviations from capital outlay

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[30] Hulten and Peterson report similar trends for the aggregate state and local government sector, using data from the National Income and Product Accounts.

Table 10.

ARIMA Models for Federal, State and Local Total Capital Outlays 1952-82 and Local Government, 1952-1982

	Moving Average Coefficients At Lag				Residual S.E.	Prob Value Chi-square on Lags to	
	1	2	3	4		6	12
Federal *	.364 (1.96)	.522 (2.81)	.378 (2.01)	-.376 (1.98)	13.9	.510	.333
Federal Excluding Defense *	-	-	-	-	3.93	.832	.728
State	-.929 (5.47)	-.457 (2.68)	-	-	3.18	.125	.372
Local	-.521 (9.27)	.702 (10.13)	1.12 (18.00)	-	2.32	.579	.514

Notes: T-statistics are in parentheses. Equations marked with an asterisk (*) are in first differences.

trends. As with debt, these deviations are best represented as moving averages. Trend deviations of total federal outlays conform to an MA(4) in first differences which explains little of the deviation variance. The unsatisfactory properties of this model are entirely the fault of defense outlays; federal civilian outlays are white noise in first differences. Among civilian federal, state and local outlays, the number of significant lags increases as government becomes more local. These three models account for 25-37% of the deviation standard errors.

The trends in per capita government capital outlays conform better to conventional wisdom than do any others presented in this paper; civilian capital outlays began a universal decline soon after 1970. They may be related, nevertheless, to results that conform less well. For example,

reductions in debt levels discussed above may be partly responsible for reduced capital expenditures.

The state and local trends are also a contrast to trends from 1900-55. During that period, the federal share in national debt increased much more rapidly than did the federal share in national tangible assets (Kuznets, in the forward to Copeland). The comparison between recent trends in Federal debt and capital outlay is similar. However, in the earlier period state and local governments increased their share of tangible assets while reducing their share of debt. Currently, debt levels are falling but capital outlays are, if anything, falling faster.

Hulten and Peterson discuss some of the conditions, such as overinvestment in long-lived capital, under which secular declines in capital expenditures are acceptable public policy. If these conditions are not currently being met, the trends in government capital outlays imply future difficulties in the provison of public services.

V. Conclusion

The descriptive regressions and ARIMA models presented here summarize concisely the important developments in government finance during the years 1952 through 1983. Among the secular themes which emerge, five are preeminent. First, civilian capital outlays are falling at an accelerat-

ing pace in all levels of government. Second, federal government expenditures are expanding at an accelerating rate, presumably fueled by similarly rapid growth in federal debt. Third, local special districts are also growing quadratically, again fueled by debt, but debt which is probably revenue bonded rather than guaranteed. Fourth, state governments, in aggregate, have a healthy and continuing surplus of revenues over expenditures. Fifth, local governments depend upon intergovernmental revenues to maintain balance between revenues and expenditures while reducing debt.

Deviations from these trends conform to three stochastic themes. Stochastic persistence tends to increase at more disaggregate levels of government. Expenditures tend to have longer lags than do revenues. Revenues and expenditures are typically autoregressions, while debt levels and capital outlays are typically moving averages.

These findings demonstrate that important intertemporal changes occur in levels and distribution of government economic activity. Yet no theory of public finance addresses the intertemporal structure of government of public finance addresses the intertemporal structure of government activity so as to predict them. The secular and stochastic 'facts' established here are sufficiently interesting to justify new efforts to develop such a theory, and sufficiently complete to serve as initial tests.

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