GOVERNMENT SIZE AND ECONOMIC GROWTH

by

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Executive Summary

Government serves many useful functions, including some economic ones. The findings here support the view that the growth of government in newly emerging nations and economies tends to increase output. Presumably this reflects the reduction in transactions' costs and the improved environment for investment associated with a rule of law and enforceable property rights. At the same time, in modern times relative American federal government spending has expanded rapidly, reflecting sharp increases in transfer payments. The evidence suggests that large transfer payments in particular have negative consequences for growth. The results for the federal government are confirmed for state and local governments and several other countries. The findings suggest that a federal budget strategy of constraining spending growth below output growth, with particular attention paid to constraining transfer payments, would have positive effects on economic growth

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INTRODUCTION

It is a fact that no society throughout history has ever obtained a high level of economic affluence without a government. Where governments did not exist, anarchy reigned and little wealth was accumulated by productive economic activity. After governments took hold, the rule of law and the establishment of private property rights often contributed importantly to the economic development of Western civilization, and it has similarly impacted on other societies as well. Government is a necessary, though by no means sufficient, condition for prosperity.

It is also a fact, however, that where governments have monopolized the allocation of resources and other economic decisions, societies have not been successful in attaining relatively high levels of economic affluence. Economic progress is limited when government is zero percent of the economy, but also when it is at or near 100 percent. The experience of the old Soviet Union is revealing, as was the comparison of East and West Germany during the Cold War era, or of North and South Korea today. Too much government stifles the spirit of enterprise and lowers the rate of economic growth.

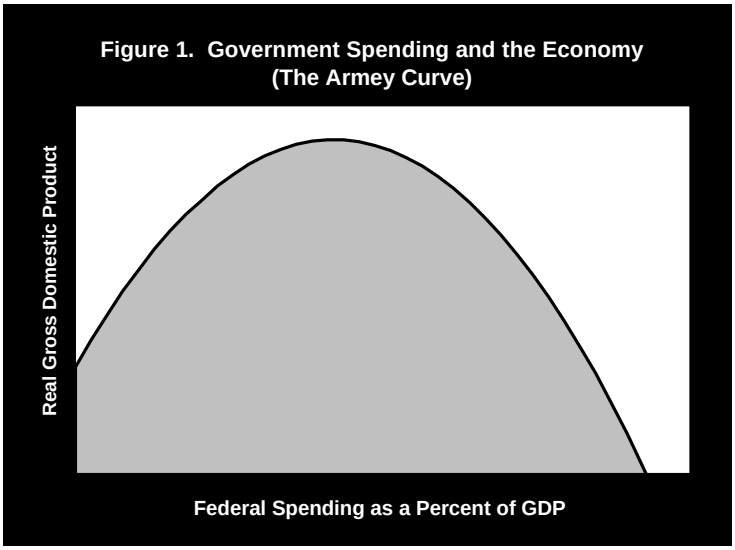
If no government is too little, but all-encompassing government is too much, what is about right from the standpoint of maximizing economic welfare? Has the growth of government in the United States and other advanced industrial nations proceeded too little, too much, or about right from the standpoint of increasing the output of goods and services? Should the United States expand governmental activity faster or slower than the growth in the economy as a whole in order to expand output of goods and services?

THE ARMEY CURVE

Borrowing a graphical technique popularized by Arthur Laffer, Representative Richard Armey, an economist by training, developed what he termed the Armey Curve (see Figure 1).[1] In a state of anarchy, output per capita is low. Similarly, where all input and output decisions are made by government, output per capita is likewise low. Where there is a mix of private and government decisions on the allocation of resources, however, output often is larger. The output-enhancing features of government dominate when government is very small, and expansions in governmental size

[1] See Richard Armey, *The Freedom Revolution* (Washington, D.C.; Regnery Publishing Co., 1995), for a discussion of his perspective.

are associated with expansions in output. At some point, however, further expansion of government no longer leads to output expansion, as the growth-reducing aspects of government grow larger, and the growth-enhancing features of government diminish. Further expan-sion of government contributes to economic stagnation and decline.



Why is this so? In a world without government, there is no rule of law, and no protection of property rights. Bullies and strong people can steal the assets of weaker persons with impunity. There is little incentive to save and invest because the threat of expropriation is real and constant. Moreover, without some collective action, there is no protection from bigger bullies, namely foreign nations, or pirates on the high seas. Collective action also facilitates the creation of roads that improve transportation and lower trading costs. Government can also create a reliable medium of exchange, further developing the gains from trade. Thus, the establishment and early growth of government is associated with rising levels of income and positive rates of economic growth.

As governments grow, the law of diminishing returns begins operating. While the construction of roads initially assists output expansion, the construction of secondary roads and upgrading primary roads start to have less added positive impact per dollar spent. Moreover, the taxes and/or borrowing levied to finance government impose increasing burdens. Low tax rates become higher. New taxes, such as income taxes, are added to low consumption levies, with increasingly adverse effects on human economic behavior. Tariffs are raised, thwarting trade. New government spending no longer enhances economic growth.

When government is small, political actions at income redistribution via tax policy or through payments to the poor are modest in magnitude. As transfer payments and progressive taxation grow with increasingly large government, the negative effects of governmental spending magnify. In small amounts, welfare payments help the poor and do not dramatically influence behavior. As the payments grow larger and more comprehensive, they lead to pronounced work disincentive effects. Thus, it is to be expected that as government absorbs an increasingly large percent of national output, incremental spending will actually have an adverse effect on output.

The Armey Curve does not suggest that "all government is bad." To the contrary, some government serves the public good. But like most good things, too much of it is harmful. Just as drinking one glass of wine daily may be good for the drinker's health but drinking 10 glasses is bad,

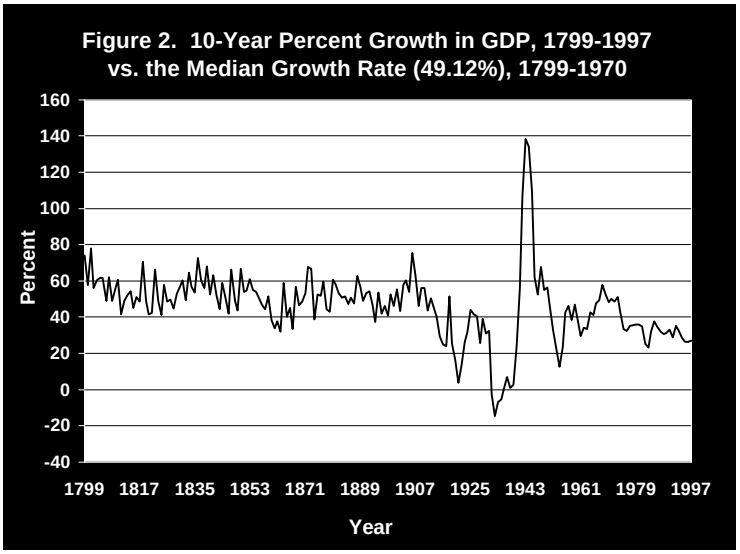
so government in moderation is good for the economy while in excess it is bad. Milton Friedman, comparing the United States and Hong Kong, put it well recently:

> Government has an essential role to play in a free and open society. Its average contribution is positive; but I believe that the marginal contribution of going from 15% of the national income to 50% has been negative.....[2]

Professor Friedman is suggesting that the threshold where government's role in economic growth is probably somewhere between 15 and 50 percent of the national income or output. We will test that assertion shortly.

THE GROWTH SLOWDOWN

America's large lead over many other areas of the world in economic supremacy has eroded over time. Moreover, annual real output in the United States is typically growing less rapid than was the case in earlier decades, as Figure 2 demonstrates. While the current economic boom has been long lived and been characterized by unemployment as low as we have seen in more than two decades, this is the first long (more than three years) economic recovery since reliable data were first available in (1854). There has not been a single year in which real output has risen at least 4 percent.



The output slowdown is not unique to the United States. Growth rates in Europe, for example, are lower in the past generation than in the preceding one. Both Europe and the United States have had a marked growth in the size of government relative to total output in recent years. By contrast, growth rates in many nations of Asia today are higher than a generation ago. In many of these places, such as Hong Kong or Korea, the private sector's growth has been faster than that of government. That is particularly true in the region's giants, China and India. As government's role in resource allocation has declined relative to that of the market-based private economy, it seems that growth rates have accelerated. This casual evidence would seem to support the existence of an Armey Curve phenomenon.

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[2] Milton Friedman, "If Only the U.S. Were as Free as Hong Kong," *Wall Street Journal*, July 8, 1997, p. A14.

THE ARMEY CURVE IN THE UNITED STATES

Does the historical experience verify the existence of the Armey Curve? The short answer is yes, whether the frame of reference is the contemporary American economy, the American economy over long-time frames, or the economies of other nations. Statistical testing suggests that many modern Western economies are in the downward-sloping portion of the Armey Curve, where reduction in the relative size of government would have positive effects on economic opportunities for the citizenry.

There are various ways of precisely defining the Armey Curve. One approach is to relate government as a percent of total output, *G* , to total output (real gross domestic product), *O*. The Armey Curve as portrayed in Figure 1 can be expressed in a simple quadratic fashion, as follows:

(1) $O = a + bG - cG^2$.

The positive sign on the linear term, *G*, is designed to show the beneficial effects of government spending on output, while the negative sign for the squared term means the variable measures any adverse effects associated with increased governmental size. Since the squared term increases in value faster than the linear term, the presence of negative effects from government spending eventually will outweigh the positive effect, producing the downward-sloping portion of Figure 1.

Output expands over time, of course, for reasons unrelated to government size. Human and capital resources grow, so one would expect that with the passage of time, *T*, output will grow. To control for this factor, we introduce the time variable *T* in our initial statistical analysis, defining the first year examined, 1947, with the value one, the year 1948 with the value two, and so on, up to the value 51 for the last year examined, 1997.[3] Also, output varies with the business cycle. We would expect output to be below the time-trend gross domestic product (GDP) in years in which the civilian unemployment rate, *U*, is high. Therefore, we will expand equation

(1) by the addition of time trend and unemployment variables. Thus, the final form of a statistical estimating equation designed to explain variations in the level of real GDP over the period 1947 to 1997 is demonstrated in Equation 2:

(2) $O = A + bG - cG^2 + d\,T - eU$.

[3]This model was reported in our *The Impact of the Welfare State on the American Economy* prepared for the Joint Economic Committee in December 1995. More recent data are included in the reported results.

The results of estimating expression (2) using ordinary least squares regression analysis are reported in Table 1.[4] All the independent variables are significant at the 5 percent level or better. The results permit a statistical estimation of the Armey Curve in Figure 1, specifically the point where output is maximized. The Curve peaks where government spending equals 17.45 percent of GDP. Since federal spending in recent years has been between 20 and 22 percent of GDP, the results suggest that the federal government is 12-20 percent too large from the standpoint of growth optimization. The last year in which federal spending was below 17.5 percent of GDP was 1965.

Table 1. Regression Analysis Used to Explain Variations in Real Gross Domestic Product, United States, 1947-1997

Regression Term or Statistic	Statistic or Regression Coefficient	t-Statistic
Constant	-566.15	-1.07
Federal Spending as a % of GDP	121.17	2.27
Square of Federal Spending as a % of GDP	-3.47	2.39
Time	136.07	24.28
Unemployment	-60.71	-9.64
R2	.9994	
Durbin-Watson	2.144	
ARMA Adjustment	2	
F-Statistic	13,094.12	

If this result is correct, the Nation since 1965 has been in the negatively sloped portion of the Armey Curve - higher government spending (as a percent of total output) is associated with lower levels of real output. If true, this suggests that a post-1965 statistical analysis using a traditional linear model (dropping the squared term in the second equation) would produce a *negative relationship* between government spending and growth. As equation (3) demonstrates, this the case, with the negative relationship significant at the 1 percent level:

$$(3)\quad O = \underset{(13.48)}{1356.42} - \underset{(4.55)}{30.48}\,G - \underset{(7.11)}{51.38}\,U + \underset{(122.08)}{127.87}\,T,$$

$$\bar{R}$$

[4] The data on government spending as a percent of GDP are based on fiscal year data. The unemployment rate data are for calendar years. Two ARMA terms introduced to control problems of serial correlation are not listed.

D-W = 1.98 , R^2 = .999, F = 6085.98, ARMA = (0,4),

where the numbers in parentheses are t-values. These results suggest that for each 1 percent increase in the government share of GDP, the GDP itself falls by about $30 billion. Since the numbers are expressed in 1992 dollars, the figure in current dollars would be slightly higher, perhaps $34 billion. Since a 1 percent change in GDP is currently about $80 billion, this suggests that $80 billion in federal spending has associated with it an output-reducing impact of about $34 billion, or somewhat more than 40 percent of the total - the "deadweight" loss of modern government. These results are remarkably consistent with other findings on the efficiency costs of taxation, the primary means used to finance government.[5]

All of these results are consistent with the interpretation that the early development of the welfare state in the first half of this century did not harm economic growth, and indeed even had some positive impact on output. The expansion of government since the Great Society of the mid-1960s, however, has had a deleterious impact on the rate of economic growth. Moreover, the relatively robust economic conditions of the 90s are explainable in terms of some decline in the government share of GDP. That share fell from about 22.6 percent in 1991 to about 20.2 percent today (partly estimated). 1997 was the fifth consecutive year in which government spending fell as a percent of GDP, suggesting relatively more efficient private sector spending was substituting for governmental activity, thereby leading to a positive impact on economic growth. The only other postwar period where government's share of GDP fell for more consecutive years was from 1983 to 1989, a period of unprecedented modern peacetime prosperity. In the 80s, the conservative Republican Administration of Ronald Reagan promoted restrained governmental growth with positive economic effects. In recent years, a Democrat President (Bill Clinton) has largely embraced a fairly conservative budget policy under pressure from a Republican-controlled Congress.

THE IMPACT OF GOVERNMENT DOWNSIZING ON NATIONAL OUTPUT

From Table 1, we can calculate that the fall in government's share in GDP from 1991 to 1997 has raised the GDP level almost precisely 1 percent. In other words, the moderate downsizing of the relative size of government added roughly 0.15 percentage points to the average annual GDP growth observed over the past six years. The growth slowdown observed in recent times would have been even greater were it not for some reduction in the federal government's role in our society.

Interestingly, using the current size of federal government spending (roughly 20 percent of GDP), Milton Friedman is right on another point: *on average* the government's contribution is positive (the GDP would be lower if there were no government). The aggregate positive contribution of government is estimated for 1997 to be about $1 trillion. However, *at the margin*, government's impact has been noticeably negative.

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[5] Perhaps the standard reference is Charles L. Ballard, John B. Shoven and John Whalley, "A General Equilibrium Computation of the Marginal-Welfare Costs of Taxation in the United States," *American Economic Review*, March 1985. They observed efficiency losses varying from about 20 to about 50 percent of tax revenues.

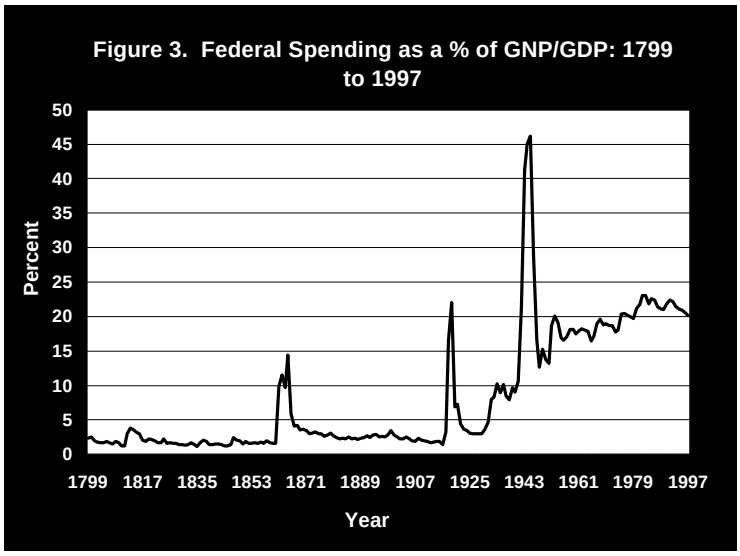
The data here suggest that a further reduction in government size to 17.45 percent of GDP would be growth enhancing. The positive impact of government downsizing at the margin gets smaller as we approach the optimum. Nonetheless, the results from (1) would suggest that reducing federal spending by about 2.75 percent of GDP (or by about $225 billion) would raise GDP by slightly more than $30 billion a year. This is a permanent increase. The present value of that increase over, say, the next generation reaches into several hundred billion dollars.[6] It is certainly worth doing.

Moreover, this estimate of effects is almost certainly too small. The implicit deadweight loss from government spending implied here is less than 15 percent, well under the estimates for deadweight loss from taxes usually observed. Using the estimates from (3) above, the gains to GDP by reducing government spending as a share of GDP to 17.45 percent rises to more than $80 billion a year. Furthermore, additional empirical work below suggests that the optimal size of government may well be smaller than 17.45 percent.

If this analysis is correct, a sound budget policy would be for the Nation to continue to allow for modest growth in federal spending, but by amounts less than overall nominal increases in gross domestic product, so that spending declines as a percent of GDP. At the same time, the results above, while fairly robust statistically, are only one test of the Armey Curve hypothesis, and alternative model specifications or time periods might offer different results.

A TEST OF THE ARMEY CURVE FROM PRESIDENTS WASHINGTON TO CLINTON

To deal with the possibility that the results in Table 1 are a statistical artifact of some sort, we modified the model in two ways. First, we looked at the historical experience from 1791 to the present, that is from the Administration of President Washington to that of President Clinton. Second, we looked at an alternative formulation of the Armey Curve, namely looking at the rate of *change* in output (or economic growth), rather than the *level* of output. This also helps us deal with severe statistical problems of analyzing data over extremely long time periods.



The growth in the size of the federal government over time is substantial relative to the economy as a whole, as

[6]The present value of a $30 billion enhancement of GDP over a 25-year period using a 3 percent real interest rate (thus taking into account the impact of inflation on nominal GDP values) is $522.4 billion.

Figure 3 indicates. Prior to 1916, it was rare for federal government spending to exceed 3 percent of total output except during wars. The ratcheting up of spending to the high single digits in the interwar period was followed by a second ratcheting up in spending into the double-digit percentages following World War II.

Our interest is in long-term growth, not business cycle fluctuations. Accordingly, instead of trying to explain single-year rates of growth in output, which are often largely determined by the business cycle, we look at the five- or 10-year rate of growth in output, which presumably largely reflects longer term growth trends. Since we are looking at growth over a five- or 10-year period, it is appropriate to measure *G* (government spending as a percent of GDP) and G^2 using an average of those measures over the same time period.

There may be a time trend towards higher or lower growth in real GDP over time. Given the slowdown in the rate of population growth, there may be some tendency for the growth rate to fall over time. To account for this, we again introduce a time variable *T* in the analysis, where the value of *T* is simply the year in question. Finally, there were three wars that were extraordinarily dramatic in their short-term economic impact: the Civil War, World War I and World War II. A war variable *W* was used that measured the percentage of years in the five- or 10-year period examined that included war years (1861-65, 1917-19, and 1941-45).[7]

With *O* now standing for the *change in output*, the results obtained for 1796 to 1996 using the five-year averages were:

$$(4) \qquad O = \underset{}{73.691} + \underset{(2.253)}{1.518}\, G - \underset{(4.989)}{0.069}\, G^2 - \underset{(7.257)}{0.030}\, T + \underset{(1.669)}{7.362}\, W, \qquad \underset{(2.441)}{}$$

$$\_R^2 = .637,\ F = 39.950\ ,\ D\text{-}W = 1.771,\ ARMA = (0,5).$$

The Armey Curve is confirmed, with both the terms being statistically significant at the 1 percent level. The time trend variable is only marginally significant (at the 10 percent level), while the variable measuring the presence of major wars is significant at the 5 percent level. The results suggest that the size of government was optimized at 11.06 percent of total output, sharply below current levels and, indeed, below the level observed in the postwar period. This analysis would suggest that while the

[7]There are a number of data problems associated with any long-term time series analysis. Data for changing total output for the years 1791-1888 were taken from Thomas Senior Berry, *Production and Population Since 1789: Revised GNP Series in Constant Dollars* (Richmond, VA: Bostwick Press, 1988); for 1889-1928, we used U.S. Department of Commerce, *Historical Statistics of the United States, Colonial Times to 1970* (Washington, D.C.: Government Printing Office, 1975); for post-1929 data, we used the *Economic Report of the President*, various years. Government spending data were derived from *Historical Statistics*... and various issues of the *Economic Report*... Before 1929, the output measure is gross national product; after 1929, gross domestic product is used.

relative size of the federal government was too small during the 19th and even during this century before 1940, the fact that postwar government size did not return to prewar levels in a relative sense had a negative impact on the economy, reflected in such phenomena as marginal income tax rates of more than 90 percent as late as 1963.

Equation (4) was reestimated for 1801-1996 using 10-year averages of the relevant variables:

$$(5) \quad 0 = \underset{}{350.875} + \underset{(6.385)}{3.033\,G} - \underset{(3.984)}{0.113\,G^2} - \underset{(4.046)}{0.166\,T} + \underset{(5.527)}{0.034\,W} \quad \underset{(0.592)}{}$$

$$\bar{R} = .640, \quad F = 39.582, \quad D\text{-}W = 2.001, \quad ARMA = (0,5).$$

The relevant variables are again significant at the 1 percent level. The size of government that maximizes economic growth is now estimated at 13.42 percent of total output, up a good deal from the estimate in (4). At the same time, however, this is still well below the 10-year average percent of total output absorbed by federal spending in any postwar year, the low being 16.28 percent in 1956. It is about, however, the governmental proportion observed in several individual years in the late 1940s or early 1950s. The observation that the United States was in the negatively sloped part of the Armey Curve in the postwar era is confirmed by looking at the simply bivariate relationship between *G* and output growth for the years 1950 to 1996:

$$(6) \quad O = \underset{}{77.423} - \underset{(10.543)}{2.093\,G}, \quad \underset{(5.672)}{}$$

$$R^2 = .651, \quad \bar{F} = 29.601, \quad D\text{-}W = 1.856, \quad ARMA = (0,2).$$

By contrast, if one looks at the period of peace between the Civil War and World War I (1875-1916) when the 10-year average of government spending as a percent of GDP was consistently in the low single digits, a positive linear relationship is observed between government spending as a percent of GDP and GDP growth

$$(7) \quad O = \underset{(2.777)}{24.135} + \underset{(2.961)}{9.845\,G}, \quad \underset{}{}$$

$$R^2 = .215, \quad \bar{F} = 3.804, \quad D\text{-}W = 1.781, \quad ARMA = (3,0).$$

Put simply, small government seems to be growth enhancing; big government is growth reducing.

DECOMPOSING FEDERAL SPENDING

It is possible to take our original model, the results of which are reported in Table 1, and look at the various components of federal spending and how they relate to output. Do we still find Armey Curves? Or, are some forms of federal spending so debilitating that there is a case that there is a continuously negative relationship between spending and output? Are other forms of spending

Table 2. Regression Results: Categories of Federal Spending and Economic Growth, 1947-1997

Category of Spending	Does a Persistently Negative Spending/ Growth Relationship Exist?	Does the Armey Curve Exist?
All Entitlements (Income Security + Health + Social Security + Medicare)	Yes	Yes*
Income Security	No	Yes
Health	No	No
Defense	No	No
Net Interest Payments	Yes*	Yes
Other Federal Spending	No+	No

*The linear term is statistically significant at only the 10-percent level.

+The relationship is positive and statistically significant.

continuously positive in their impact? How has the changing composition of federal spending over time impacted on growth?

We estimated equation (2) for many different categories of spending. Literally scores of regressions were run, and in the interests of readability and efficiency the results are summarized in Table 2. Beginning with income maintenance or entitlement programs which currently dominate the federal budget, we generally see the existence of an Armey Curve, or, worse, a persistent negative spending-output relationship. The broadest measure of transfer payment spending, incorporating income security, health, medicare, and social security, shows *both* a statistically significant Armey Curve and a statistically significant linear negative relationship. It may well be that when this broad category of spending was relatively small (say, less than 3 percent of GDP, which was the case before 1958), further expansion had some modestly positive effects, but that those effects are dominated by the negative effects of expansion once these programs became large (first passing 10 percent of GDP in 1982). The Armey Curve analysis suggests that these transfer payment programs reached their optimal size from an output maximization perspective at about 7.33 percent of GDP, about the level reached in 1974.

Since total spending on these transfer payment programs now approximates 11.5 percent of GDP, this analysis suggests that about these payments exceed the growth optimization point by about 4.2 percentage points of GDP (currently somewhere around $350 billion annually). This gap is more than the total gap between actual *total* federal government spending (as a percent of GDP) - about 20 percent - and that amount that would maximize output (17.4 percent of GDP, using the 1947-97 data and the original model). Thus, the evidence seems to suggest that the problem of excessive government growth in the postwar era is a problem relating to entitlements and income transfers. There is a distinct Armey Curve relationship observable with respect to income security programs

Table 3. Components of Federal Spending, 1947-1997, as Percent of Total

Year	Major Transfer Payments and Income Security	Defense	Net Interest Payments	Other
1947	10.14%	37.10%	12.17%	40.58%
1960	21.48%	52.16%	7.48%	18.87%
1970	29.70%	41.77%	7.36%	21.17%
1980	44.07%	22.68%	8.88%	24.37%
1985	43.96%	26.70%	13.68%	15.66%
1990	44.01%	23.88%	14.70%	14.70%
1996	55.71%	17.03%	15.45%	11.81%

(AFDC, food stamps, etc.). There is no statistically significant relationship between spending on health and output.

Turning to other parts of the federal budget, the data do not conform to either an Armey Curve or a linear relationship between defense spending and output. The simple linear relationship is negative, but not statistically significant. The findings seem to call into some question the suggestion that "imperial overreach" may be contributing to U.S. economic decline.[8] Interest payments on the national debt, actually another form of transfer payments, seem to have a negative impact. A simple negative-linear relationship between interest payments and output is marginally significant (at the 10 percent level), whereas the Armey Curve relationship is highly significant. The only category of federal spending, which shows some *positive* relationship with output, is the "other" category, a residual category that includes such things as educational, highway, environmental, agricultural, and foreign aid spending.

While the growth in government beyond its optimal size may be an important factor in the growth slowdown observed in the past decade, one factor has been the compositional shift in federal spending, indicated in Table 3. The types of federal spending growing in relative importance over time - transfer payments for income maintenance or interest on the federal debt - are precisely those programs showing a significant negative relationship to output. The programs having a benign or even positive impact on output growth, notably defense and "other," have declined sharply in relative importance.

All of this suggests that from the standpoint of enhancing the growth in the production of goods and services, a budget strategy would:

[8] See, for example, Paul Kennedy, *The Rise and Fall of the Great Powers* (New York: Random House, 1987) for an extended discussion of how empire building can drain resources of powerful nations.

1) reduce federal expenditure growth in general below that of total output growth, thereby reducing the claim that federal spending makes on total output;

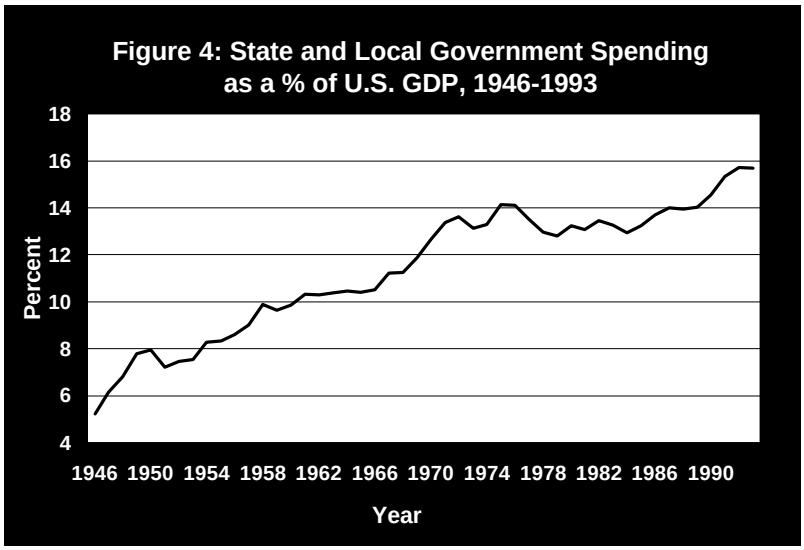
2) place particular emphasis on containing transfer payments, stopping their growth relative to income and output. These results support the arguments of persons advocating limiting the growth of entitlements.

3) the maintenance of balanced budgets would appear to be useful, inasmuch as that would reduce net interest payments of the federal government as a percent of GDP over time.

STATE AND LOCAL GOVERNMENT AND THE ARMEY CURVE

One might object that the results above are only for the federal government. Perhaps state and local government spending does not conform to the same pattern. Data limitations prohibit the very long (e.g., back to George Washington's time) analysis, but some examination for the postwar period confirms the presence of an Armey Curve.

As Figure 4 illustrates, state and local spending as a percent of GDP has risen consistently in the postwar era, rising from 5.2 percent in 1946 to 9.9 percent in 1960, to 13.3 percent by 1980, and to 15.7 percent in 1993. Thus, in less than one-half of a century, the proportion tripled, with the state and local government spending 10 percentage points more of GDP in 1993 than 47 years earlier.



Looking at data for 1957 to 1993 and relating the five-year change in real GDP to the five-year average of state and local governmental general expenditures as a percent of GDP and the square of that term, we obtain:[9]

[9] Data for state and local expenditures are from the 1997 *Economic Report of the President*, p. 397. Data are not available on a consistent annual basis for prior to 1952, and given the five-year period used, the analysis is confined to years after 1957. The data as reported in the *Economic Report* stop in 1993.

$$(8) \qquad O = -94.574 + 20.331\,G - 0.890\,G^2, \qquad (2.211) \quad (3.070) \quad (3.267)$$

$$\bar{R}^2 = .550,\ F = 16.067,\ D\text{-}W = 1.806,\quad ARMA = (1,0).$$

Again, the Armey Curve relationship is statistically significant at the 1 percent level. The size of state and local government that maximizes the growth rate in GDP is 11.42 percent. Using either the annual or the five-year average data, that proportion was exceeded in 1969. Hence it is not surprising that a statistically significant (at the 1 percent level) *negative* bivariate relationship is observed between state and local spending as a percent of GDP and GDP growth for the 1969-93 period, whereas a *positive* relationship is observed over the period 1950 to 1968.

In 1993, state and local spending was 15.68 percent of GDP, suggesting that a reduction in that spending as a percent of GDP of more than one-fourth would optimize economic growth. Indeed, the evidence is that federal spending, although somewhat excessive from the standpoint of growth maximization, is far closer to the optimum than that of state and local governments. At the same time, however, federal policy plays a major role in the determination of state and local governmental expenditures, as the Medicaid program so well illustrates.

SOME INTERNATIONAL EVIDENCE

While the analysis about shows a fairly impressive body of evidence supporting the existence of the Armey Curve, it is possible that the results are somewhat spurious. They do not fully account for other factors that might impact output growth. For example, some economic thinkers have argued that economic growth is strongly influenced by cycles of innovation.[10] Perhaps the rise in the relative size of government coincided with, say, a slowdown in the rate of innovation for reasons unrelated to government. Thus, government spending may not be the casual factor in the slowdown in the rate of economic growth. Unfortunately, things like "the level of innovation" are difficult to quantify with much precision.

One thing that can add to our confidence that the Armey Curve phenomenon exists is to replicate our results for other countries. Different nations have different political environments, different spending histories, and different patterns of change in nonobservable variables, such as the pace and pattern of innovation. Moreover, most other advanced industrialized nations have had an even more extensive development of the welfare state in modern times than has the United States. If the Armey Curve relationship is observable in the United States, it should be even more strongly evident in nations

[10] The most noted 20th century advocate of this view was Joseph Schumpeter. See his *Theory of Economic Development* (Cambridge, MA: Harvard University Press, 1934). Modern day "real business cycle" theorists emphasizing technology and other exogenous shocks are in the Schumpeterian spirit. For a discussion, see Charles Plosser, "Understanding Real Business Cycles," *Journal of Economic Perspectives,* Summer 1989.

where the rise of transfer payments has led to governmental spending at a higher proportion of total output than is the case in the United States.

We obtained data on central government spending, nominal and real national output (gross national product or gross domestic product) for five industrial nations: United Kingdom, Denmark, Italy, Sweden, and Canada. Excepting Canada, in every case data are available for over 100 continuous years. The British data go back to 1830, near the end of the British Industrial Revolution. Italy's statistics began in 1862, at the time of Italian unification and before that nation began its "take-off" into sustained economic growth. The Scandinavian country data begins in 1854 (Denmark) or 1881 (Sweden), before or at the time these nations began their major growth spurt.[11] The data for Canada begin only in 1926.[12]

As Figure 5 shows, the modern growth in the welfare state in some of these nations far outdistances that of the United States. Thus, if an Armey Curve exists in those countries, the negative growth consequences of the welfare state may be far greater than is the case in America.

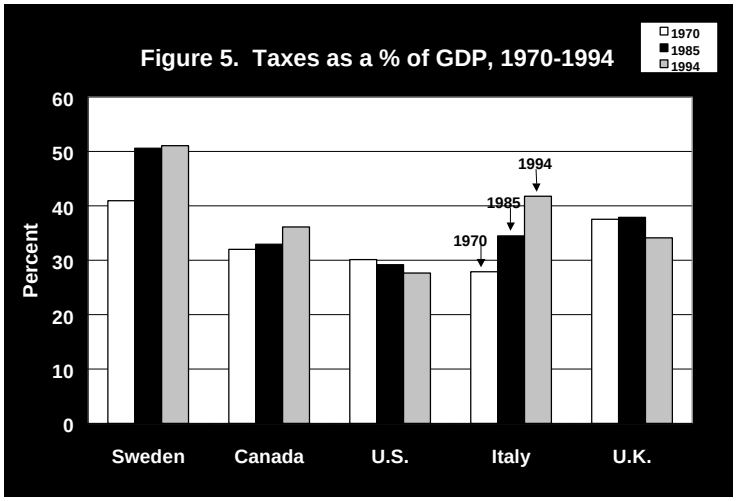


Table 4 presents results for a model where a 10-year rate of growth in real output is correlated with a 10-year average of the percent of total output absorbed by government spending, *G*, and that variable squared. The results show that in every single case, an Armey Curve relationship is observed, with both terms in the relationship statistically significant at the 1 percent level. Moreover, governmental spending in every case except Canada in the last year observed was dramatically larger than what the results suggest would optimize the rate of economic growth. In each of the European cases, spending reductions of 40 to 50 percent would seem desirable from the standpoint of growth optimization. For Canada, dramatically smaller (10-15 percent) reductions seem called for, similar to the results obtained for the

[11]In his *The Stages of Economic Growth* (Cambridge, U.K.: Cambridge University Press, 1960), Walt W. Rostow dates the British "take-off" to 1783-1802, and the Swedish take-off to 1868-1890 (p. 38). He does not explicitly indicate the Italian or Danish take-off dates.

[12]Data were obtained from B.R. Mitchell, ed., *International Historical Statistics*, Third Edition (New York: Stockton Press, 1992). The data end in 1988. Because of some inconsistencies between the Mitchell and other data sources, it was decided not to update the data to include the early 1990s. In any case, virtually all the rise in the modern welfare state had occurred by the early 1980s.

Table 4. Armey Curve Results, Five Countries, Relating Average Government Spending as % of GP over 10 Years to 10-Year GDP Growth Rate

Statistic or Co-efficient Years Covered	Canada 1926-88	Denmark 1854-1988	Italy 1862-1988	Sweden 1881-1988	United Kingdom 1830-1988
Constant	-199.84**	14.09*	-82.96*	8.22*	14.86*
G	25.31*	2.68*	10.76*	3.73*	1.06*
G^2	-0.59*	-0.05	-0.22	-0.10	-0.03
R^2	0.8218	0.7622	0.77	0.8332	0.8051
D-W	1.88	1.88	1.86	1.85	1.91
F-ratio	59.81	80.51	65.71	81.78	88.33
ARMA Adjustment	(1,1)	(0,2)	(0,4)	(0,4)	(0,5)
1988 Government as % of GDP #	23.32	50.46	40.80	36.01	32.23
Optimal Government as % of GDP #	21.37	26.14	22.23	19.43	20.97

United States using data for the 1947-1997 period. Similar results, not reported in the interests of brevity, are obtained using five-period intervals for the key variables.

There has been some controversy over the slowdown in European rates of economic growth since 1970. One view is that the slowdown is to be expected, that European growth rates from 1945 to 1970 were unusually high, and that the more recent experience is a return to normalcy. An alternative view is that the expansion of the European welfare state after 1970 has stifled the spirit of enterprise and has had negative growth consequences. The findings above clearly are consistent with this alternative perspective.

CONCLUSIONS

Government serves many useful functions, including some economic ones. The findings here support the view that the growth of government in newly emerging nations and economies tends to increase output. Presumably this reflects the reduction in transactions' costs and the improved environment for investment associated with a rule of law and enforceable property rights. At the same time, in modern times relative American federal government spending has expanded rapidly, reflecting sharp increases in transfer payments. The evidence suggests that large transfer payments in particular have negative consequences for growth. The results for the federal government are confirmed for state and local governments and several other countries. The findings suggest that a federal budget strategy of constraining spending growth below output growth, with particular attention paid to constraining transfer payments, would have positive effects on economic growth.