# STATE POLICY & ECONOMIC DEVELOPMENT IN OKLAHOMA: 2006

**A Report to**


**OKLAHOMA 21st CENTURY, INC. 330 N.E. 10TH OKLAHOMA CITY, OKLAHOMA 73104-3200**

# OKLAHOMA 21st CENTURY, INC.
# BOARD OF DIRECTORS




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# OKLAHOMA 21st CENTURY, INC.

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# STATE POLICY AND ECONOMIC DEVELOPMENT IN OKLAHOMA: 2006

**A Report to**
**OKLAHOMA 21st CENTURY, INC.**
**By**

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**Kent W. Olson**

## Chapter 1

### The *Skinny* on Oklahoma's Personal Income

*Robert C. Dauffenbach*

This chapter presents what the author calls the *skinny*, or real facts, on Oklahoma's real per capita personal income (RPCPI), a measure of economic welfare that is often used to determine how well a state is doing in terms of economic development. The first part of the chapter is a primer on per capita personal income as a measure of economic well-being and the price indexes that can be used to convert per capita personal income (PCPI) into real per capita personal income (RPCPI). Data on the latter are used then to make comparisons of growth among various states and also among regions within Oklahoma. Some economic factors that may help explain differentials in RPCPI are then examined, including educational attainment, degree of urbanization, housing costs, and climate. This discussion is followed by an econometric analysis that isolates the effects of these variables on interstate differences in RPCPI.

The author finds that, although Oklahoma's RPCPI is below the national average, it has actually grown slightly faster than the national average RPCPI since 1929, and it has increased in recent years from 81 to 84 percent of the national average. RPCPI varies widely within Oklahoma; however, the variation across counties has been falling slowly over time. The county-average growth rate was a quite respectable 2.1 percent over a broad span of time (1969-2003) and 2.2 percent more recently (1991-2003).

The two major metropolitan areas of the state, Oklahoma City and Tulsa, accounted for 64 percent of the state's total real per capita income in 2003, rising from 57 percent in 1969. In terms of recent marginal contributions to total real personal income, these two areas account for 70.7 percent of the growth, suggesting that their shares of state RPI will continue to increase. Simulations suggest that if present trends in regional gains remain in effect, the southeast quadrant will stabilize at about one-eighth of the total real personal income while the shares of the northeast, northwest, and southwest quadrants (outside the Oklahoma City and Tulsa metropolitan areas) will continue to decline. The pace of change is likely to be quite slow, however.

There is substantial variation in higher educational achievement of the adult population both within and outside of Oklahoma, with Oklahoma ranking 21$^{st}$ in the nation in percentage increase of the degreed adult population, 1990-2003. Substantial variation also exists among the states in degree of urbanization, housing cost, and climate, all of which, along with variations in college attainment, are potential contributors to interstate differences in RPCPI. Econometric analysis of RPCPI among states reveals that in both 1990 and 2003, a one-percentage point increase in the share of the adult population who have bachelor's or higher degrees is associated with a $720 - $790 increase in real per capita personal income.

Isolating the importance of educational attainment in the determination of RPCPI is probably the most significant finding reported in this chapter. Oklahoma has boosted the educational attainment of its degree-holding adult population from 17.8 percent in 1990 to 24.3 percent in 2003, a 6.5 percentage point gain. As noted, the state has also seen its real per capita personal income ratio rise from 81 percent to 84 percent of the national average in recent years. It is hard to imagine a future where degree attainment will not continue to have great importance.

## Chapter 2

### A Taxpayer Bill of Rights and the Debate Over the Size of Government

*Alexander Holmes*

Advocates of a so-called taxpayer's bill of rights (TABOR) have recently gathered enough signatures on initiative petitions that it appears state voters will have to decide whether they are going to place additional restraints on state government spending. The initiative's vehicle, State

Question 726, is not about budget priorities or which function or functions of government are appropriate for the state. Instead, it is a question of what metrics ought to define the absolute magnitude of government. Implicit in State Question 726 is the notion that a state government has an "optimal" size when measured by some, but not all, of its revenue sources.

As proposed in State Question 726, the state government of Oklahoma will be at its optimal size if spending is limited to grow at an annual rate equal to no more than the sum of the rate of inflation, as defined by the consumer price index of the Bureau of Labor Statistics, plus the rate of growth of the population, as defined by the U. S. Census Bureau. While it might be logical to assume that if revenue growth due to economic activity does not sustain this level of spending then the resulting size of government is "sub-optimal," there is no presumption of this in State Question 726. Indeed, as written, if an economic downturn should occur, reducing state revenues, the base upon which future spending would be measured decreases. This creates a ratchet effect lowering future spending limits.

This chapter provides background information on taxpayers' rights as already provided for in the state constitution and statutes, contrasting them with the right to limit the level of taxation, as sought through State Question 726. The reader is also reminded that Oklahoma already has some of the nation's most restrictive tax and expenditure limits. Specific features of the proposed TABOR are examined thoroughly, leading the author to conclude that some features of the proposal would make it difficult to implement if adopted, but, probably more important, result in the maintenance of local spending at the expense of state programs.

Colorado has had a TABOR in force since 1997 that is similar to the one proposed for Oklahoma. After some serious funding problems created by the application of TABOR in a cyclical environment, Colorado voters approved a 5-year moratorium on its TABOR in late 2005. Whether a similar funding crisis would happen in Oklahoma has not been conclusively determined by studies to date that have tried to simulate what the past would have been like with a TABOR in place.

Holmes concludes by noting that TABOR is a choice between a rigid constitutional constraint and the flexibility of legislatively determined levels of government spending. If one believes that legislators are responsive to their constituents' desires for government services, both in terms of the scale and type of service offered, then a TABOR has no place in the constitution. If one believes that the election process can not provide the appropriate discipline to determine the proper outcome in a democratic system, then constitutional constraints are appropriate.

**Chapter 3**

**Oklahoma's Long-Run Budget: Sustainable? Affordable?**
*Kent W. Olson*

In this chapter, the author uses a long-run forecasting model based on changes in the level and size of an aging population and historical rates of growth in real revenues and expenditures to examine long-run prospects for Oklahoma's state government budget. What he finds is that the state's budget, like that of the federal government, is on an unsustainable path. Oklahoma state expenditures are currently designed to eventually grow much faster than state revenues, resulting in a significant fiscal gap. Like the federal budget, much of this gap stems from exploding health care entitlements, especially for Medicaid, and underfunded retirement programs, especially Oklahoma Teachers' Retirement. State revenues fail to keep pace with expenditures primarily because of relatively slow rates of growth of the general sales tax and the severance tax.

The baseline projections indicate that the state's fiscal gap (present value of expenditures in excess of the present value of receipts) in 2006 is over $616 billion. And this may be an understatement; it doesn't account for the high cost of waiting to fix it, unfunded state public employee retirement obligations, and a large fiscal gap in the Federal Government's budget.

The state's fiscal gap can be eliminated by reducing the annual rate of growth of spending or

increasing the annual rate of growth in taxes. If the former course were chosen, as seems likely, a cap on annual spending growth would have to be invoked. The annual rate of growth consistent with eliminating the fiscal gap is far greater than the annual rate of growth that would be invoked under a Colorado-type TABOR, however. The latter would shrink government spending as a percentage of real personal income far below its current level (from over 7 percent of real personal income to nearly 2 percent). Eliminating the fiscal gap, however, would allow government spending as a percentage of real personal income to grow well beyond its current level (to over 17 percent of real personal income). Assuming that the current ratio of government spending to real personal income is about right, this suggests a spending cap related to the growth of real personal income, unlike a TABOR cap that would limit real spending growth to the rate of growth in the total population. Given the rates of growth inherent in an uncapped environment, the imposition of any spending cap is going to require some difficult budget choices. Hopefully, they will be made only after careful consideration of the costs saved relative to the benefits given up.

**Chapter 4**

**State Policy and Oklahoma High-Tech Economic Development**

*Larkin Warner and Robert C. Dauffenbach*

Since the late 1980s, Oklahoma state government has emphasized policy promoting technology-based economic development. There have been two major dimensions to this policy initiative. First, support has been provided to create, nurture, and expand technology-based business firms. Second, support has been aimed at enhancing the state's scientific and technological research and development infrastructure. In this chapter, the authors ask whether, as intended, the new economic development policies adopted in the late 1980's: (1) shifted the structure of Oklahoma's economy toward high-tech sectors, (2) increased financial support for the state's R&D infrastructure, especially from the federal government, and (3) improved Oklahoma's ranking relative to other states with respect to its high-tech orientation.

In spite of Oklahoma's state policy emphasis on high-tech development since the late 1980s, the state's overall economic structure has not become demonstrably more oriented toward this type of activity. At the same time, there has been a marked increase in R&D expenditures at the state's institutions of higher education, with expenditures at the University of Oklahoma, Oklahoma State University, and the University of Tulsa more than doubling from $131 million to $295 million between 1990 and 2003.

The absence of major aggregate structural response does not mean that the state's policies have been ineffective. Obviously, the state could have lost ground since the 1980s if it had not been for policies of OCAST and other state initiatives such as EPSCoR, the endowed professorships, and State Questions 680 and 681 with their removal of constitutional constraints on state university/private business linkages.

It is also clear, at the microeconomic level, that there are numerous instances in which state-sponsored research, technical transfer, and technical assistance have assisted in the development of technology based enterprise. The growth of academic R&D infrastructure has already paid off in terms of technology-based firm start-ups. Moreover, this expansion of R&D capacity promises longer-term favorable impacts on technology-based economic development. And no matter how extensive the microeconomic impact on high-tech firms, the state's allocation of funds to activities aimed at generating additional federal funds almost always involves substantial and immediate benefits exceeding state costs. A striking example of this involves the University of Oklahoma and its Health Sciences Center where in Fiscal 2005 state-funded research of $19.8 million was associated with $125.9 million in externally funded research—largely involving federal funds.

Thus the question is not whether state policies for high-tech development have had favorable outcomes. Individual technology-based firms have been helped, and there have been significant increases in academic R&D spending with increased federal funding. Yet the relative overall

structure of the state's economy has not become more high-tech. Thus a challenging question is whether the state has done enough.

A possible answer to this question is found in lessons from two technology-based activities already well established in Oklahoma: academic R&D and the Presbyterian Health Foundation Research Park. In both cases, policies have been relatively narrowly focused and, especially with the PHF facility, have involved the commitment of substantial resources. The outcome of the former is a sustained program of research with a cadre of post-docs and graduate students and with a steady stream of federal funding. The lesson from the Presbyterian Health Foundation Research Park is simple: spend $70 million on targeted research infrastructure, and results follow.

**Chapter 5**

**Education Reform in Oklahoma: A State at Risk?**

*Ronald L. Moomaw*

American educational achievement still lags behind that of many other countries and it has not improved significantly over time. Oklahoma performance lags behind the American average and it, too, has not improved significantly over time. In this chapter, the author first provides some evidence supporting these claims. Then he considers whether the lagging performance is caused by lack of funding or organizational structure.

The debate over education reform was initiated over two decades ago by the 1983 publication of a "Nation at Risk," a report based on international comparisons and the lack of improvement in standardized scores. According to data examined by the author, the title of the 1983 report still describes the national situation. Oklahoma's scores are below national scores and its trends in general are not encouraging. So, if the United States is a "Nation at Risk," Oklahoma qualifies as a "State at Risk."

The National Education Association and the Oklahoma Education Association argue that the national and state educational problems are problems of funding. The author christens this approach "Stay the Course." He concludes, after carefully examining the data relating expenditures per student to student performance, that there is, at best, a weak effect of additional financial support on student achievement.

The executive and legislative branches of the federal government have weighed in on the issue by adopting its No Child Left Behind initiative. The premise of this approach, on which the author places the label "Improve or Else" is based on the assumption that lack of school accountability is a major source of the educational system's failure to improve. He argues that there is merit in this approach, especially in so far as it sets standards and the requirement that students achieve these standards, and establishes consequences for states who fail to get their students to acceptable levels of performance. The accountability approach falls short of the mark, however, because it is too centralized, or "top down" in nature. As such, it fails to tap the reservoir of creativity, energy, and innovation in the local schools and communities throughout the country.

The author calls the approach that would do the latter, "The Customer is Always Right." This approach has been crafted by economists and others in think tanks and universities who argue that the nation's ineffective educational system is a consequence of what is essentially a public school monopoly that denies parents choice in the selection of an educational institution for their children.

With government financing much education, accountability of the schools to politicians and politicians to tax payers is inevitable. Central decision maker probably should use testing to evaluate whether schools are meeting national or state objectives. National or state decision maker(s) should certify the schools that meet the standards and prohibit uncertified schools from operating with public monies. Accountability could be established through testing programs.

To the extent that the central authorities limit their objectives and to the extent that they permit

principals, teachers, and parents to operate to meet these objectives without detailed planning requirements, efficiency or educational performance can improve. Parents and students could have extensive choice among available schools for their children. Market-like forces would work to improve the performance of all schools as they attempt to attract students. It is important to remember that these market-like forces already provide many higher-income families with a choice of schools for their children, either through private schools or residential choice. To narrow the equal opportunity gap, lower-income families could receive targeted vouchers that could be spent on education at the discretion of the family.

# The *Skinny* on Oklahoma's Personal Income

This paper presents the *skinny*, or real facts, on an important facet of economic welfare both within Oklahoma and between the states. It uses real per capita personal income as the primary measure of economic well-being. In the first section, the usefulness of personal income as a measure of economic welfare is explored. Choice of the inflation series to use to adjust for price changes is then examined. Interstate comparisons on the variable real per capita personal income (RPCPI) are then presented, followed by within-state comparisons. Some economic factors that may help explain interstate differentials in RPCPI are then examined, including educational attainment, urbanization, housing costs, and climate. This discussion is followed by an econometric analysis that attempts to isolate the influence of these variables on interstate differences in RPCPI.

The paper seeks answers to the following questions:

1. What is the trend in Oklahoma's real per capita personal income and how does it compare to neighboring states and the nation?
2. How do the various regions of Oklahoma compare in RPCPI levels and growth rates and how much have these regions contributed to Oklahoma's aggregate real personal income, population, and employment growth?
3. What are the levels of and dispersion in bachelor's and higher degree attainment among the states and among Oklahoma's regions?
4. What has been the trend and dispersion of urbanization and housing costs among the states?
5. To what extent among the states can differentials in RPCPI be attributed to the proportion of the adult population who hold bachelor's or higher degrees and other variables?

The primary data sources for the analyses presented below are the US Bureau of the Census and the US Bureau of Economic Analysis (BEA). In particular, the work of the BEA in preparing detailed time series on the components of personal income is to be applauded. Without the Herculean efforts of that agency, much of what we know about regional economic performance would have never been calibrated. This is the agency that also prepares national income statistics. The reader is encouraged to visit the website of the BEA, www.bea.gov.

Principal findings include:

- Oklahoma has participated well in the better than five-fold increase in RPCPI nationally since 1929, advancing over six and one-half times to $25,700 in 2004;
- Relative variation in state RPCPI has stabilized from depression-era highs of nearly 50 percent to approximately 16 percent, where it has remained essentially constant in the last 30 years. This suggests that remaining variation is caused by other factors such as differences in regional price levels, housing costs, locational amenities, and other nonpecuniary variables. Oklahoma's persistence in scoring a per capita personal income ratio with the nation in the low 80 percent range in non-energy boom/bust periods supports this view;

- Within Oklahoma, RPCPI varies widely. However, relative variation has been falling from 20+ percent in 1969 and 1980 to 15 percent in 2003. The county-average growth rate was a quite respectable 2.1 percent over a broad span of time (1969-2003) and 2.2 percent more recently (1991-2003). Taking the long view, there is remarkable consistency in regional RPCPI growth rates;
- Rates of growth in RPCPI equal rates of growth in total real per capita income minus the population growth rate. Using this relationship, it is shown that the western portion of the state has achieved the statewide average RPCPI through zero or slightly negative population growth;
- The two major metro areas of the state, Oklahoma City and Tulsa, accounted for 64 percent of the state's total real per capita income in 2003, rising from 57 percent in 1969. In terms of recent marginal contributions to total real personal income, these two areas account for 70.7 percent of the growth, suggesting that these two areas will continue to advance in their share of state totals.
- Simulations suggest that if present trends in regional gains remain in effect, the southeast quadrant will stabilize at about one-eighth of the total real personal income while the northeast, northwest, and southwest quadrants will continue to decline. The pace of change is likely to be quite slow, however;
- Both within and outside of Oklahoma, there is substantial variation in higher educational achievement of the adult population, a potential contributing factor to variation in regional RPCPI. Encouragingly, Oklahoma ranked 21st in the nation in percentage increase of the degreed adult population, 1990-2003.
- Substantial variation exists in urbanization of states, housing costs, and climate, which are also potential contributors to RPCPI differentials;
- Econometric analysis of RPCPI among states reveals that in both 1990 and 2003, a one-percentage point increase in the share of the adult population who have bachelor's or higher degrees is associated with a $720 - $790 increase in real per capita personal income.

Isolating the importance of educational attainment in the determination of RPCPI is, most likely, the most significant finding of the study. Oklahoma has boosted educational attainment of its degree-holding adult population from 17.8 percent in 1990 to 24.3 percent in 2003, a 6.5 percentage point gain. The state has also seen its per capita personal income ratio with the nation rise to 84 percent from 81 percent in recent years. It is hard to imagine a future where degree attainment will not continue to have great importance. However, production of degree holders is only a part of the story. They must be utilized within state boundaries, too. Fortunately, the State of Oklahoma appears to be making use of its higher education endowments, but much work remains to be done.

## Economic Welfare

Economic welfare comparisons among regions, states, and counties in the U.S. are frequently based on personal income (PI), and for very good reason. From personal income, households pay taxes, save, and purchase goods and services. It might well be argued that disposable income, out of which households consume and save, would be a better measure. However, such a measure would have to involve computation of the tax bill of all households in a region, including tax incidence effects. Analysis of just how the burden of various forms of taxes impact households versus businesses is a quite complicated endeavor. Thus, the principal measures of economic welfare fall back a level to personal income.

Regions vary, of course, in the value of total personal income and the number of persons benefiting from that income. To normalize the data for comparison purposes, total personal income is typically divided by population to produce per

capita personal income (PCPI). Such normalization provides the opportunity to compare regions cross-sectionally, i.e., at a given time. Comparisons across time, however, require adjustments for the rate of inflation enabling researchers to speak in terms of real per capita personal income (RPCPI). Such adjustments are necessary in order to compute meaningful growth rates in economic well-being. A national measure of inflation is applied to the data to standardize for price effects across time. Yet, we still have problems in making regional comparisons. One problem relates to choice of the inflation series and there are several to choose from, the consumer price index (CPI) and the Implicit Price Deflator (IPD) from the national income accounts being the two major contenders.

Another problem is that a national measure of inflation is, obviously, an average measure across all regions. While national markets set the prices of a large number of the goods and services households consume, one market in particular is strongly regional. That market is the housing market, representing a large proportion of household expenditures. There is substantial variation in housing costs regionally, as we are reminded just about every passing day of late in the national news. These costs are certainly involved in the economic attractiveness of various regions and *real levels of satisfaction* associated with geographic location choice. More complete analyses have to take into account such regional differentials in housing costs.

There are other problems, as well. As an average, RPCPI fails to account for the distribution of income. That is why studies of poverty rates are so important. It also falls short of the economist's definition of real income, which is more akin to the notion of the level of satisfaction, thereby including nonpecuniary elements. Climate, regional recreational and cultural amenities, commuting times, educational quality and cost, and health care facilities are all examples of such elements. These are important features of an economic location, but at times these features are difficult to quantify.

While RPCPI is then seen as an incomplete measure of economic well-being, it is certainly an important facet. Policy makers pay particular attention to this measure in hope of devising economic development policies to advance a state and its regions. Thus, this paper seeks to enhance our understanding of Oklahoma's economic welfare, concentrating on personal-income-based measures of economic welfare. The analysis will have both macro and micro aspects. By macro, we mean the examination of personal income trends among the states. By micro, we mean the examination of personal income trends of regions and counties within the state. The quest is much larger than just assembling myriad statistics to examine trends and dissect differences. The paper attempts to estimate, econometrically, some of the sources of personal income differentials among regions. That is, it seeks to explain why these differentials exist, which should help point the way to what can be done from a public policy perspective to advance the state's economic welfare.

Several explanatory variables will be explored in the analysis of RPCPI differentials among states. Educational attainment, as measured by the percent of the adult population (25+ years) that have bachelor's or higher degrees, is one such explanatory variable. This is certainly a variable that has huge public policy implications. Industry employment patterns, the degree of urbanization among regional economies, climate, and, of course, the cost of housing, are additional explanatory variables that will be utilized to provide insight into differentials in economic welfare both within and across time.

## Choice of Deflator

Brief mention is made of the choice of the inflation series used to compute real PCPI. Results can, of course, be sensitive to choice of the inflation index. The author uses the Personal Consumption Expenditures Deflator, a product of national income accounting. This measure is close to personal income from the standpoint that consumption is a major component in personal income. The Consumer Price Index (CPI) would have been an alternative. It is the most frequently cited measure of inflation in the popular press. But, it is widely regarded by economists to overstate inflation because of a number of known

upward biases. These biases were thoroughly examined by what has come to be known as the Boskin Commission.

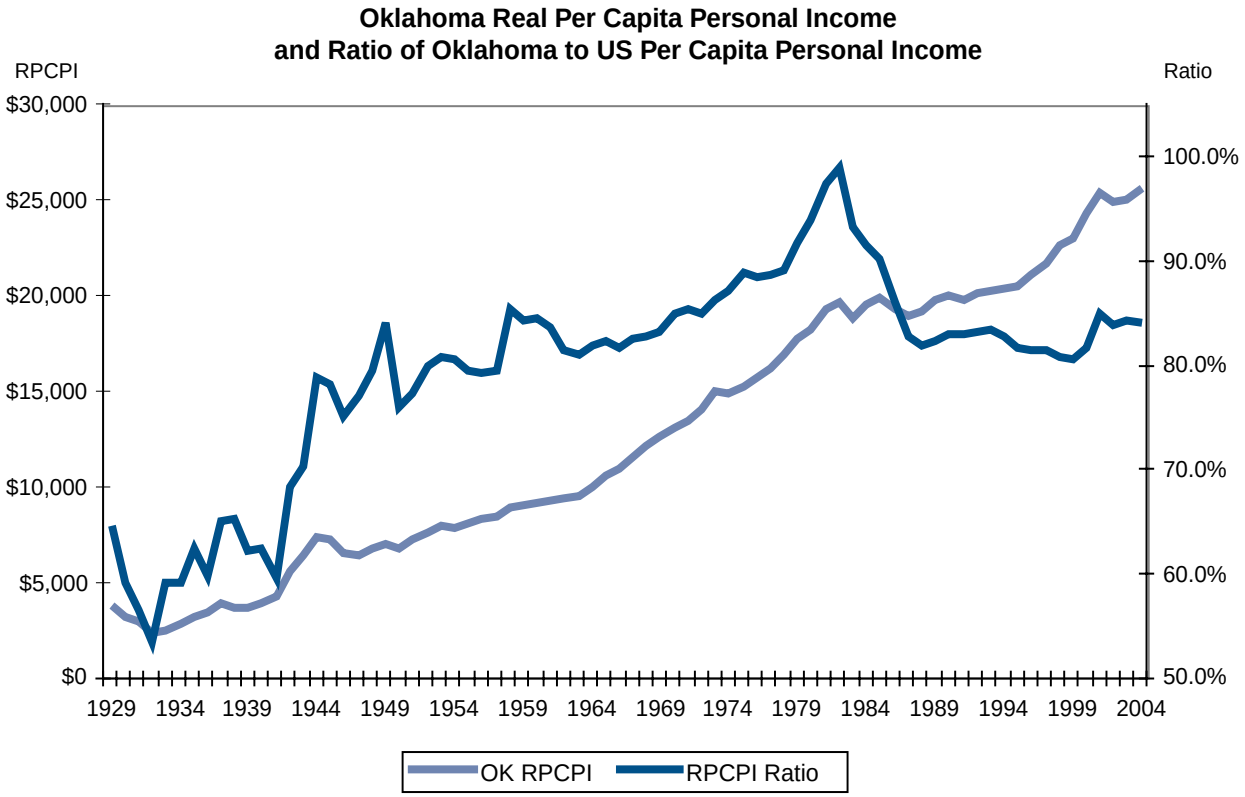
The report of this group can be found on the web.[1] Economist Michael Boskin and his team estimated the CPI overstated inflation by 1.3 percent per year. Such an overstatement has widespread implications. It leads to overcompensation for inflation for social security recipients and, of course, the CPI is used extensively in labor negotiations and contracts. My calculations show that an estimate of 0.75 percent upward bias comes closer to being correct. Such an adjustment to the CPI enables it to track quite closely with the GDP Implicit Price Deflator, an economy-wide measure of inflation. Whatever the actual extent of overstatement, it is clear that overstatement of inflation leads to understatement of real income gains. Thus, the BEA's chain-weighted Personal Consumption Expenditures Deflator, which is relatively free from the biases discovered by the Boskin Commission, is used in this analysis.

## Interstate Comparisons of RPCPI

There has been, since the collapse of the energy-boom period in Oklahoma in 1982, much hand-wringing about the levels of per capita personal income in Oklahoma in comparison to the nation and neighboring states. Lost in these discussions is recognition that the national economy has advanced from a level of RPCPI of about $6,000 in 1929 to $30,500 in 2004, a five-fold increase, and that Oklahoma has shared in that advance, rising from $3,900 in 1929 to $25,700 in 2004, a 6.6-fold advance.

Figure 1.1 graphically portrays the advance of inflation-adjusted per capita personal income for Oklahoma as well as the ratio of Oklahoma's RPCPI to the nation's. Note that Oklahoma has been near or about the 80 percent ratio since 1952. The energy-boom clearly lifted Oklahoma's ratio, but we have returned to historical ratios. Despite these comparatively low ratios, Oklahoma has continued to gain population, even though the state did not grow quite as fast as the nation between 1990 and 2000.

**Figure 1.1**



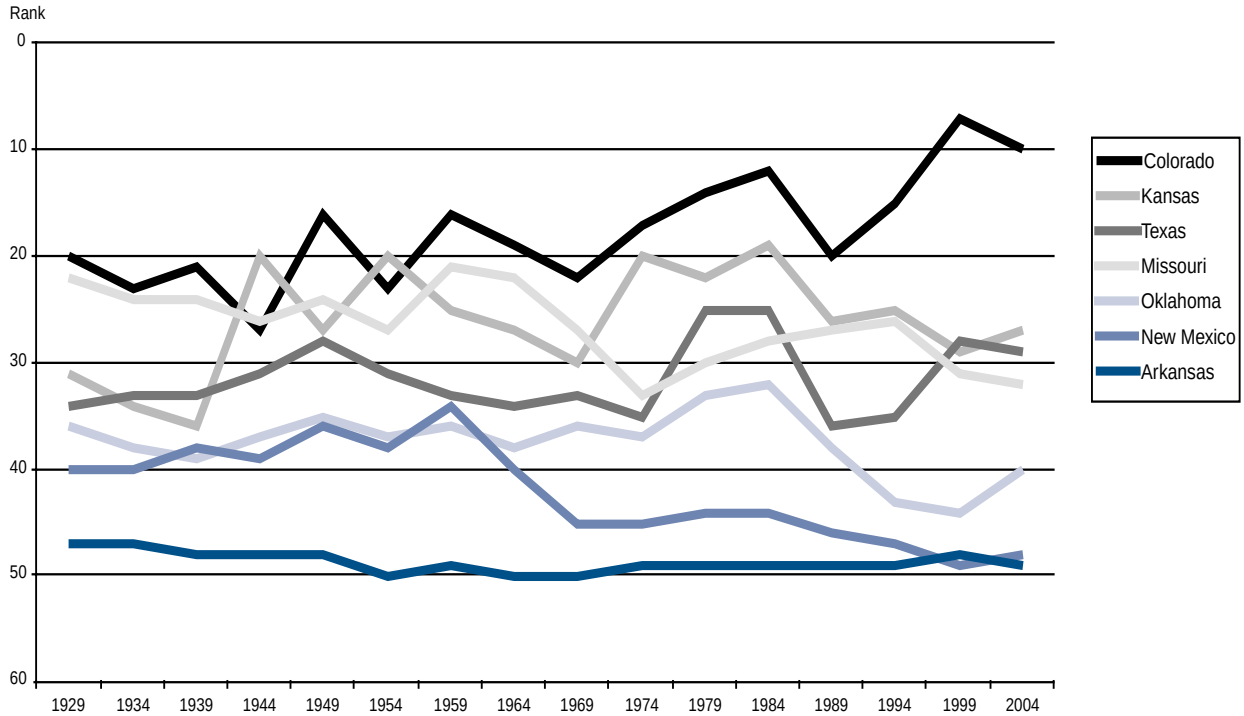
Oklahoma didn't lose all of the robust growth in population achieved during the energy-boom, either, and real personal income held up fairly well in the face of the energy-bust. Note also that Oklahoma's ratio has "blipped-up" in recent years, advancing from an 81 percent in 1999 to an 84 percent ratio in 2004, a hopeful sign.

Figure 1.2 shows how Oklahoma and its surrounding states have varied in their rankings nationally over time. Oklahoma, with a high 30's ranking for much of the time through the early 1970's, achieved a 32 ranking and subsequently lost 12 places to be ranked 44th in 1999. The 2004 ranking places Oklahoma 40th in the nation. Arkansas has been consistently near the bottom of state rankings. New Mexico has been declining in the rankings since 1959. Texas has essentially oscillated around a ranking of 30th while Kansas has varied around 25th. Missouri has experienced a secularly declining ranking. Only Colorado in this region has shown dramatic trend improvement in its ranking. That state averaged about 21st prior to the energy-boom when its ranking improved, and fell once again in the energy-bust period, but recent gains have taken it to 10th in the nation. Colorado benefits from what Joel Kotkin calls "very sophisticated consumers of place."[2] Stated otherwise, highly-educated entrepreneurs and technologists like to live and ski in scenic mountain areas.

Economic theory predicts that people will relocate to areas of higher real incomes and away from areas of lower real incomes, thereby reducing supply in the poorer areas, advancing supply in the richer areas, all with a tendency to equalize real incomes between areas. Of course, the question is, "what is real income?" As argued above, there are many things other than simply pecuniary gains involved in the determination of real income. States typically do not change much in their comparative rankings over broad spans of time. For those that do, there are generally factors that we can identify that have caused the change, such as the energy boom/bust in Oklahoma.

**Figure 1.2**

**State Rankings, Oklahoma and Surrounding States**
**1929-2004 Selected Years**



Other than these obvious event-driven factors, the states seem to have approached a relative equilibrium, as illustrated in Figure 1.3. Graphed here is the average 50 state (plus DC) level of RPCPI and the coefficient of variation (C.V.). The latter is a measure of relative variation, the standard deviation of RPCPI divided by the arithmetic mean of RPCPI. In 1932 the C.V. was 49 percent, meaning that variation in RPCPI was about one-half the size of mean value. As is apparent in the graphic, the C.V. has stabilized at about 15-16 percent. It is quite apparent that relative variation in real per capita personal income among states has diminished dramatically over time. And, relative variation hasn't changed much in 30 years.

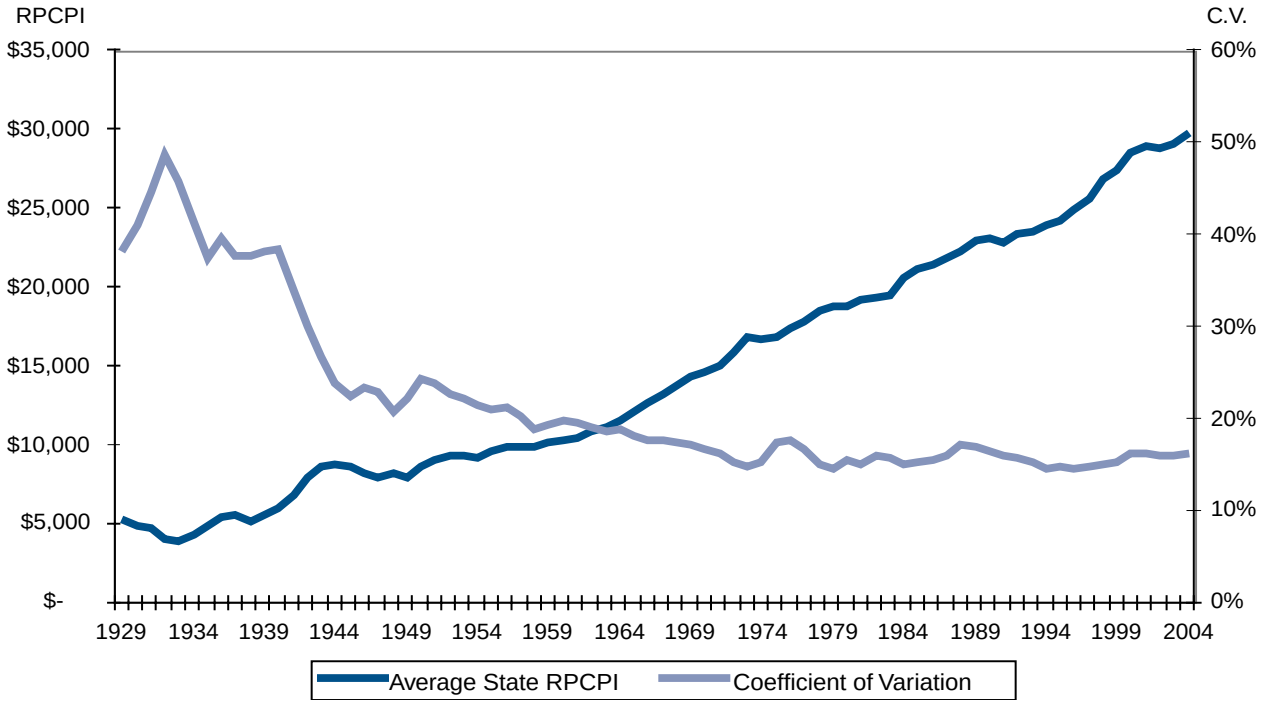
Appendix Table 1.1 reports state RPCPI for years 1969, 1991, and 2004 including growth rates. Despite a range of $22,500 (Mississippi) to $42,000 (Connecticut), rates of growth over substantial time periods are seen as remarkably similar with low relative dispersion of 13.5 percent for 1969-2004 and 18.2 percent for 1991-2004. These indicators of stabilization suggest that perhaps while real money income has not equalized between regions, *real satisfaction*, the economist's broader definition of real income, consisting of both monetary and nonpecuniary aspects, may be much more closely aligned between regions. This issue will be explored econometrically later in the paper.

## Within-State Comparisons

Data from the US Bureau of Economic Analysis are available from 1969 to 2003 to develop statistics to study variation in real per capita personal income within Oklahoma. County-level data are available. Detailed tables for Oklahoma's 77 counties have been constructed of RPCPI and growth rates; they appear in Appendix Table 1.2.

**Figure 1.3**

**Average Real Per Capita Personal Income for the 50 States and District of Columbia and Relative Variation**



To summarize the data in a more digestible form, the state is divided into six regions consisting of the seven-county Oklahoma City metropolitan statistical area, the seven-county Tulsa metropolitan area, and four remaining regions designated NE, NW, SE, SW. Interstate highways I-35 and I-40 were largely used as dividing lines for assignment of the non-metropolitan counties into regions. The assignments are shown in Appendix Table 1.2, second column.

Table 1.1, below, reports a number of interesting features of RPCPI among Oklahoma counties. The mean RPCPI is an unweighted-for-population mean of county RPCPIs. Between 1969 and 2003, the average RPCPI about doubled. Relative variation in RPCPI among counties diminished from 20+ percent in 1969 to 15 percent in 2003. The dollar differential between the richest and poorest county grew substantially, however, from about $10,000 in 1969 to $17,700 in 2003. A better measure of differentials is found in the Interquartile Range statistic, which is the value of the first-quartile (25 percent of counties with lower RPCPI) subtracted from the value of the third-quartile (25 percent of counties with higher RPCPI). This statistic indicates a spread of about $3,900 in 2003 versus $2,740 in 1969.

Reported in Table 1.2 are mean rates of growth, where it is seen that the 1969-1980 period was one of substantial growth and that 1980-1991 growth rates were diminished by recovery from the energy-bust. The mean rate of growth in RPCPI was 2.1 percent for the entire period, a very respectable rate of advance. Note also, that there is considerably less relative variation in the mean rate of growth for the entire period as shown by the C.V. (Coefficient of Variation) statistic. Also, as indicated by the Interquartile Range statistic, only a 0.5 percent difference separates the first and third quartile values for the entire period.

Table 1.3 focuses on RPCPI growth in the six regions of the state. Frequently heard among economists in the state is the view that the western portion of Oklahoma is suffering in comparison with other regions of the state. Part B of Table 1.3 shows, for example, that growth rates in total real personal income (unadjusted for population change), were substantially lower in the western region. The total value of real personal income grew by only 1.9 percent in the western region in comparison to 3.0 percent growth for the entire state. Compounded annually over a 34 year period, state real personal income grew by about 177 percent in comparison to 91 percent in the western region.

**Table 1.1**

**Real Per Capita Average County Personal Income in Oklahoma and Related Statistics, Selected Years**

| | Real Per Capita Personal Income (RPCPI) Statistics ($000 and %) | | | | Growth Rate Statistics for RPCPI | | | |
|---|---|---|---|---|---|---|---|---|
| | 1969 | 1980 | 1991 | 2003 | 1969-1980 | 1980-1991 | 1991-2003 | 1969-2003 |
| Mean | 10.79 | 15.32 | 16.95 | 21.52 | 3.5% | 1.1% | 2.2% | 2.1% |
| Std. Deviation | 2.18 | 3.31 | 2.86 | 3.20 | 1.1% | 1.2% | 0.8% | 0.4% |
| C.V. | 20.2% | 21.6% | 16.9% | 14.9% | 31.0% | 105.5% | 38.1% | 19.9% |
| First Quartile | 9.16 | 12.65 | 15.31 | 19.41 | 3.1% | 0.3% | 1.9% | 1.9% |
| Median | 10.63 | 15.14 | 16.76 | 21.07 | 3.6% | 1.1% | 2.2% | 2.1% |
| Third Quartile | 11.91 | 17.04 | 17.97 | 23.31 | 4.0% | 1.8% | 2.7% | 2.4% |
| Interquartile Range | 2.74 | 4.39 | 2.66 | 3.90 | 0.9% | 1.5% | 0.8% | 0.5% |
| Max | 17.21 | 25.57 | 26.59 | 33.61 | 5.4% | 5.3% | 3.9% | 3.0% |
| Min | 7.37 | 9.56 | 11.70 | 15.90 | -1.4% | -1.5% | -1.9% | 0.6% |
| Max-Min | 9.84 | 16.01 | 14.89 | 17.72 | 6.8% | 6.8% | 5.8% | 2.4% |

**Table 1.2**

**In-State Regional Comparisons of RPCPI Growth**

**A. Real Per Capita Personal Income Growth Rates**

| | 1969-1980 | 1980-1991 | 1991-2003 | 1969-2003 |
|---|---|---|---|---|
| State | 3.3% | 0.8% | 2.0% | 2.0% |
| OKC | 3.2% | 0.2% | 2.2% | 1.9% |
| TUL | 3.4% | 0.8% | 2.0% | 2.1% |
| NE | 3.2% | 1.0% | 1.4% | 1.9% |
| NW | 3.7% | 0.6% | 1.7% | 2.0% |
| SE | 3.4% | 1.0% | 2.1% | 2.2% |
| SW | 2.6% | 1.3% | 2.1% | 2.0% |

**B. Real Personal Income Growth Rates**

| | 1969-1980 | 1980-1991 | 1991-2003 | 1969-2003 |
|---|---|---|---|---|
| State | 5.0% | 1.2% | 2.9% | 3.0% |
| OKC | 5.3% | 1.3% | 3.4% | 3.3% |
| TUL | 5.5% | 1.6% | 3.1% | 3.4% |
| NE | 4.7% | 1.1% | 2.2% | 2.7% |
| NW | 4.7% | -0.4% | 1.6% | 1.9% |
| SE | 5.0% | 1.1% | 2.7% | 2.9% |
| SW | 2.9% | 0.8% | 2.0% | 1.9% |

**C. Population Growth Rates**

| | 1969-1980 | 1980-1991 | 1991-2003 | 1969-2003 |
|---|---|---|---|---|
| State | 1.7% | 0.4% | 0.8% | 1.0% |
| OKC | 2.1% | 1.0% | 1.2% | 1.4% |
| TUL | 2.1% | 0.7% | 1.1% | 1.3% |
| NE | 1.5% | 0.1% | 0.8% | 0.8% |
| NW | 1.0% | -1.0% | -0.1% | 0.0% |
| SE | 1.6% | 0.1% | 0.7% | 0.8% |
| SW | 0.3% | -0.5% | -0.2% | -0.1% |

In terms of growth in RPCPI, the analysis reveals, somewhat surprisingly, that over the full 1969-2003 time period, the two western regions grew at a rate that matched the state's weighed-average growth rate of 2.0 percent.

There is a mathematical relationship that explains this result of comparative similarity in growth rates:

$$RPCPI_{gr} = RPI_{gr} - POP_{gr}$$

That is, the growth-rate of RPCPI equals the growth rate of real personal income minus the growth rate in population. Using this relationship, it is possible to decompose the growth rate of RPCPI into two components: personal income growth and population growth. Within rounding error, the reader can see the truth of this mathematical relationship by comparing corresponding cells in the three sub-tables. The western regions of the state have experienced, essentially, no population growth since 1969, as illustrated by the computations presented in Table 1.2, Part C. In consequence, their growth rates in real per capita personal income about match their growth rates in real personal income, which then places their RPCPI growth rate near the state average. Population changes are, then, seen as acting to preserve growth rates in RPCPI about the state.

Another view on the question of regional growth within the state relates to the distribution of gains in total real personal income. Considerable insight can be gained on future directions of regional shares through use of the methodology outlined below.

A tabulation of regional levels of total real personal income is presented in Table 1.3, Part A. Note that the resulting matrix of values can be viewed vertically, the common way of thinking about regional shares, or horizontally. The horizontal view allows us to consider the contributions of a region to total personal income growth. These contributions are what economists call *marginal* changes. Such changes can be computed over a given time interval by selecting a base year.

For example, the seven-county OKC metropolitan statistical area in 1969 represented 31.3 percent of 1969 total real personal income. As is apparent in the table, the OKC MSA has experienced a rising share over time. Viewing the table horizontally, we see that this region, over the 1969-2003 period, contributed $21.039 Billion of the $56.674 Billion growth in statewide total real personal income since 1969. This calculation is performed by subtracting the 1969 level from the 2003 level of total real personal income for the OKC MSA and the state, and forming the ratio of the two values. Thus, the OKC MSA contributed 37.1 percent of the total gain between 1969 and 2003.

Different base years can be used to assess marginal contributions. In Table 1.3, Part B, we see that the OKC region is gaining in share. Table 1.3, Part C reports the marginal contributions to year 2003 using different base periods: 1969, 1980, and 1991. The shares of the marginal contributions in comparison with the percentage distribution for the most recent year provide indications on the future direction of regional shares.

For example, the OKC MSA has a marginal contribution, using the 1991 base, of 40.0 percent, exceeding that region's share of total real personal income in 2003 of 35.0 percent. If the marginal contribution remains high, over a long span of time, mathematically we would expect the average share to eventually match the marginal contribution. The pace can be rather slow with growth of total real personal income at about 3.0 percent per year, but the direction is dictated by the marginal contributions.

Examining other regions in Table 1.3, we see that the seven-county Tulsa region has a share of total real personal income that about matches its marginal contribution. The share of total real personal income was 29.0 percent in 2003 and its marginal contribution is 30.7 percent using the 1991 base. Thus, some minor increase is expected in the Tulsa MSA share of total real personal income if current trends continue. For the NE region, the marginal contributions are less than the per-year percentage share. Thus, continuing declines in the percentage share would be predicted by this methodology. Indeed, this conclusion applies to the NW and SW regions, too. For the SE region, however, the marginal contribution is about equal to the percentage share. Thus, the SE region is anticipated to continue to account for about one-eighth of total real personal income.

**Table 1.3**

**Regional Analysis of Total Real Personal Income**

**A. Regional Total Real Personal Income ($millions)**

| | 1969 | 1980 | 1991 | 2003 |
|---|---|---|---|---|
| OKC | 10,061 | 18,083 | 20,783 | 31,100 |
| TUL | 8,243 | 15,054 | 17,861 | 25,773 |
| NE | 3,920 | 6,602 | 7,492 | 9,699 |
| NW | 2,500 | 4,055 | 3,798 | 4,619 |
| SE | 4,066 | 7,147 | 8,104 | 11,298 |
| SW | 3,326 | 4,564 | 4,975 | 6,300 |
| Total | 32,116 | 55,505 | 63,013 | 88,790 |

**B. Regional Shares of Total Real Personal Income**

| | 1969 | 1980 | 1991 | 2003 |
|---|---|---|---|---|
| OKC | 31.3% | 32.6% | 33.0% | 35.0% |
| TUL | 25.7% | 27.1% | 28.3% | 29.0% |
| NE | 12.2% | 11.9% | 11.9% | 10.9% |
| NW | 7.8% | 7.3% | 6.0% | 5.2% |
| SE | 12.7% | 12.9% | 12.9% | 12.7% |
| SW | 10.4% | 8.2% | 7.9% | 7.1% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% |

**C. Shares of Growth Relative to Base Year**

| | 1969 Base | 1980 Base | 1991 Base |
|---|---|---|---|
| OKC | 37.1% | 39.1% | 40.0% |
| TUL | 30.9% | 32.2% | 30.7% |
| NE | 10.2% | 9.3% | 8.6% |
| NW | 3.7% | 1.7% | 3.2% |
| SE | 12.8% | 12.5% | 12.4% |
| SW | 5.2% | 5.2% | 5.1% |
| Total | 100.0% | 100.0% | 100.0% |

Using a simple spreadsheet methodology, it is possible to simulate just how fast convergence would be to the marginal distribution of gains. Assuming the 1969-2003 average annual compounded growth rate of 3.0 percent in total real personal income obtains in future years and that the 1991 marginal distribution of gains remains constant, the resulting distribution of total real personal income in regions for future years can be projected. Table 1.4 reports these results for selected years to 2050. Review of this table reveals that the average shares are, in fact, approaching the marginal distributions, but the pace is, indeed, rather slow. In 47 years, the OKC MSA gains 3.8 percentage points of its ultimate 5.0 percentage point gain. And, of course, a lot could easily change in the marginal shares and relative pace of growth to alter this projected course. Appendix Tables 1.3 and 1.4 present the computations of similar structure to those that appear in Table 1.3 and Table 1.4 for population and wage and salary employment for interested readers.

**Table 1.4**

**Projected Distribution of Total Real Personal Income by Region**

| | 2003 | 2010 | 2020 | 2030 | 2040 | 2050 |
|---|---|---|---|---|---|---|
| OKC | 35.0% | 36.0% | 37.0% | 37.8% | 38.4% | 38.8% |
| TUL | 29.0% | 29.3% | 29.7% | 29.9% | 30.1% | 30.3% |
| NE | 10.9% | 10.5% | 10.0% | 9.6% | 9.4% | 9.2% |
| NW | 5.2% | 4.8% | 4.4% | 4.1% | 3.9% | 3.7% |
| SE | 12.7% | 12.7% | 12.6% | 12.5% | 12.5% | 12.5% |
| SW | 7.1% | 6.7% | 6.3% | 6.0% | 5.8% | 5.6% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% | 100.0% |

In summary, the analysis of within-state trends and variation in RPCPI reveals a substantial positive trend in average county values, but also significant levels of dispersion. Growth was strongest in 1969-1980, weakest in 1980-1991, and about equal to the long-term trend in 1991-2003. While variation among county values is high, particularly between the richest and poorest counties, there is evidence, especially over the long-run, that the variance is diminishing. Counties with diminished growth have preserved their per capita values through loss of population. This is particularly true of counties in the northwest and southwest regions.

The analysis of growth shares highlights the importance of the OKC and Tulsa MSA's to the economy of Oklahoma. These two regions accounted for 57 percent of total real personal income in Oklahoma in 1969; in 2003, 64 percent. The marginal contributions to real income from these two regions indicate that in the very long run these shares should be rising, although the pace of increase is likely to be quite slow. Of course, if the shares of the major metro areas are rising, the shares of other regions will fall. The marginal analysis shows that these declines are likely to be most pronounced in the NE, NW, and SW regions. The SE region appears to be "holding its own" with a one-eighth share. We now turn to examination of variables that may help us to explain inter- and intra-state differentials in RPCPI as a prelude to conducting econometric examination of differences in state RPCPI.

## Educational Attainment

Particular attention in this age of brainpower and computer chips is paid to the share of the adult population that has received a bachelor's or higher college degree. The adult population is defined as the population 25 years of age and older. Nationally, these shares have been rising significantly. In 1990, using states as the units of observation, the average share of the adult population with bachelor's or higher degrees was 20 percent. In 2000, the rate advanced to 24.1 percent and in 2003 the rate is estimated to be 26.7. Oklahoma's share has been rising, as well, but is substantially behind the national average. For the years 1990, 2000, and 2003, Oklahoma's shares are estimated to be 17.8, 20.3, and 24.3 percent. It is comforting to find recent estimates of Oklahoma's share narrowing the gap with national averages. These estimates between the census years are highly volatile, however, in that they are based on the relatively small sample obtained from the March Supplementary Surveys of the Current Population Survey.

The statistical relationship between RPCPI and the degree-holding population share is high and significant. In 1990, nationally, the simple correlation statistic was 78.2 percent; in 2000, 81.5 percent. Among counties in Oklahoma, the correlation was 63.9 and 62.4 percent, still high and significant. While the weighted average of adults with a college degree for Oklahoma was 20.3 percent in 2000, using Oklahoma's counties as the units of observation, the average was only 15.4 percent with a standard deviation of 4.8 percent. Indeed, as shown in Tables 1.5 and 1.6, the Top 3 counties accounted for over one-half of the total population of degree holders and the top 15 counties represented three-fourths of Oklahoma's total stock of degree holders in 1990 and 2000. With the strong correlation nationally between degree shares and RPCPI and the rather skewed distribution of degree holding within the state, there is little surprise in the observed variation in RPCPI within the state.

**Table 1.5**

**Top 15 Counties With Degreed Population in 1990**

| County | Degreed Population Age 25+ Years | Share of Degreed | Cumulative Percentage |
|---|---|---|---|
| Oklahoma | 86,492 | 24.4% | 24.4% |
| Tulsa | 76,438 | 21.5% | 45.9% |
| Cleveland | 26,661 | 7.5% | 53.4% |
| Comanche | 11,613 | 3.3% | 56.7% |
| Payne | 9,941 | 2.8% | 59.5% |
| Washington | 8,279 | 2.3% | 61.8% |
| Canadian | 7,745 | 2.2% | 64.0% |
| Garfield | 6,461 | 1.8% | 65.8% |
| Muskogee | 6,135 | 1.7% | 67.5% |
| Kay | 5,812 | 1.6% | 69.2% |
| Rogers | 4,525 | 1.3% | 70.5% |
| Pottawatomie | 4,467 | 1.3% | 71.7% |
| Cherokee | 4,357 | 1.2% | 72.9% |
| Stephens | 4,185 | 1.2% | 74.1% |
| Creek | 4,085 | 1.2% | 75.3% |

**Table 1.6**

**Top 15 Counties With Degreed Population in 2000**

| County | Degreed Population Age 25+ Years | Share of State Degreed Population | Cumulative Percentage |
|---|---|---|---|
| Oklahoma | 106,778 | 23.9% | 23.9% |
| Tulsa | 96,696 | 21.6% | 45.5% |
| Cleveland | 35,464 | 7.9% | 53.5% |
| Comanche | 12,846 | 2.9% | 56.4% |
| Payne | 12,733 | 2.9% | 59.2% |
| Canadian | 11,738 | 2.6% | 61.8% |
| Washington | 8,485 | 1.9% | 63.7% |
| Rogers | 7,641 | 1.7% | 65.4% |
| Garfield | 7,443 | 1.7% | 67.1% |
| Muskogee | 6,895 | 1.5% | 68.7% |
| Pottawatomie | 6,367 | 1.4% | 70.1% |
| Wagoner | 5,690 | 1.3% | 71.4% |
| Kay | 5,678 | 1.3% | 72.6% |
| Cherokee | 5,567 | 1.2% | 73.9% |
| Creek | 5,098 | 1.1% | 75.0% |

Among states, the share of the adult population who have bachelor's or higher degrees ranged from 15.3 percent in West Virginia in 2003 to 37.6 percent in Massachusetts. Table 1.7 displays the percentage shares for the top 12 states, states near Oklahoma's share, and the bottom 12 states. From 1990, the shares for all states advanced, but what is quite interesting is that the states with the highest shares are hardly "resting on their laurels." Almost all of these top states had significant advances in their degree shares that were generally higher than states near Oklahoma's share and the lowest degree-share states.

Somewhat heartening, Oklahoma's share ranked 33rd in 1990, 41st in 2000, but rose to 31st in 2003, adding 6.5 percentage points to its 1990 base of a 17.8 percent share. Also heartening, Oklahoma added 183,000 persons with degrees to its adult population, better than a 50 percent increase from the 1990 base. In addition, the marginal percentage change, defined as the ratio of the change in degreed adult persons to the change in adult population between 1990 and 2003, is 84 percent.

## Table 1.7

## College Degree Shares
## (Percent of Adult Population)

### A. States with Highest Degree Shares in 2003

| | Share '90 | Share '00 | Share '03 | '90 - '03 Gain |
|---|---|---|---|---|
| Massachusetts | 27.2% | 33.2% | 37.6% | 10.4% |
| Maryland | 26.5% | 31.4% | 37.2% | 10.7% |
| Colorado | 27.0% | 32.7% | 36.0% | 9.0% |
| Virginia | 24.5% | 29.5% | 34.2% | 9.7% |
| New Hampshire | 24.4% | 28.7% | 34.0% | 9.6% |
| Connecticut | 27.2% | 31.4% | 33.5% | 6.3% |
| New Jersey | 24.9% | 29.8% | 33.4% | 8.5% |
| Minnesota | 21.8% | 27.4% | 32.7% | 10.9% |
| Vermont | 24.3% | 29.4% | 31.3% | 7.0% |
| Kansas | 21.1% | 25.8% | 31.0% | 9.9% |
| California | 23.4% | 26.6% | 29.8% | 6.4% |
| New York | 23.1% | 27.4% | 29.6% | 6.5% |

### B. States with Degree Shares Approximate to Oklahoma's in 2003

| | Share '90 | Share '00 | Share '03 | '90 - '03 Gain |
|---|---|---|---|---|
| Ohio | 17.0% | 21.1% | 25.0% | 8.0% |
| Montana | 19.8% | 24.4% | 24.9% | 5.1% |
| Pennsylvania | 17.9% | 22.4% | 24.8% | 6.9% |
| Texas | 20.3% | 23.2% | 24.7% | 4.4% |
| Iowa | 16.9% | 21.2% | 24.6% | 7.7% |
| **Oklahoma** | 17.8% | 20.3% | 24.3% | 6.5% |
| Wisconsin | 17.7% | 22.4% | 24.1% | 6.4% |
| Alaska | 23.0% | 24.7% | 24.0% | 1.0% |
| South Dakota | 17.2% | 21.5% | 23.9% | 6.7% |
| North Carolina | 17.4% | 22.5% | 23.8% | 6.4% |
| Maine | 18.8% | 22.9% | 23.7% | 4.9% |
| New Mexico | 20.4% | 23.5% | 23.7% | 3.3% |

### C. States with Lowest Degree Shares in 2003

| | Share '90 | Share '00 | Share '03 | '90 - '03 Gain |
|---|---|---|---|---|
| Michigan | 17.4% | 21.8% | 23.3% | 5.9% |
| Alabama | 15.7% | 19.0% | 22.7% | 7.0% |
| Idaho | 17.7% | 21.7% | 22.5% | 4.8% |
| Louisiana | 16.1% | 18.7% | 22.3% | 6.2% |
| South Carolina | 16.6% | 20.4% | 22.3% | 5.7% |
| Indiana | 15.6% | 19.4% | 22.2% | 6.6% |
| Kentucky | 13.6% | 17.1% | 21.3% | 7.7% |
| Nevada | 15.3% | 18.2% | 21.2% | 5.9% |
| Wyoming | 18.8% | 21.9% | 20.7% | 1.9% |
| Mississippi | 14.7% | 16.9% | 19.3% | 4.6% |
| Arkansas | 13.3% | 16.7% | 17.4% | 4.1% |
| West Virginia | 12.3% | 14.8% | 15.3% | 3.0% |

This compares with a marginal effect nationally of 68 percent. However, lest we rest on our laurels, 20 states had marginal effects larger than Oklahoma's and 14 states had marginal increases greater than 100 percent, i.e., the increase in degreed population exceed the increase in the adult population.[3] Many of these high marginal-effect states are in the mid-west, including Ohio, Kansas, Iowa, Nebraska, North Dakota, South Dakota, Missouri, and Illinois. Nevertheless, a ranking of 21st in marginal percentage gain is to be celebrated. But, we must remember that the 2003 results are based on a comparatively small sample size, not a census count. In consequence, the standard error for Oklahoma is rather sizable at 0.8 percent.

## Metropolitan Population

States vary markedly in the share of population residing in metropolitan areas.[4] This is potentially an important variable in determination of real per capita personal income. Large metropolitan areas generate self-perpetuating labor markets that attract new entrants of both people and firms. Young people, in particular, seem to be attracted to large labor markets and the many entertainment and educational opportunities associated with such areas. Metropolitan areas also have their attendant costs, including generally higher costs of living and the "hassle" of urban life that may detract from their amenities. Thus, both positive and negative qualities are likely to be operating in the influence of metropolitan share of population on real per capita personal income.

States with large shares of their populations living in metropolitan areas include New Jersey, Massachusetts, California, Maryland, Florida, New York, Connecticut, Washington, Arizona, Texas, and Illinois, all with shares exceeding 86 percent in 2000 and, for some states100 percent of inhabitants live in metropolitan areas. States with low population shares in metro areas include Wyoming, Vermont, Montana, South Dakota, Mississippi, North Dakota, West Virginia, Nebraska, Kentucky, Arkansas, and Maine, with shares less than 60 percent and as low as 30 percent in the case of Wyoming. Oklahoma is 15th from the bottom with a 63 percent share, but over the years since 1969, it has increased its share by 6.6 percentage points. Variation in the metropolitan population may help explain differences in state RPCPI.

## Housing Costs

Housing costs would, of course, be expected to impact regional differentials in RPCPI.[5] While potentially an important explanatory force in state RPCPI determination, unfortunately, there are no state-wide indices of housing costs for standard dwellings. The US Government's Office of Federal Housing Enterprise Oversight (OFHEO) maintains indices by state, constructed using a "repeated sales" methodology.[6] However, for 1980 the index is set equal to 100 for each state. Thus, this index doesn't provide data on what housing costs are per state, but only by how much the prices have inflated over the years.

Nevertheless, the index values are fascinating. Since 1975, the California house price index is up 12.7 times; Maryland, 10.5; Rhode Island, 8.7; New Jersey, 8.3; Washington, 8.3; Hawaii, 8.0; New York, 7.7; New Hampshire, 7.5; Maine, 7.1; and Connecticut, 7.0. At the other end of the spectrum, in Iowa, the house price index is up 3.8 times; Arkansas, 3.7; Alabama, 3.6; Alaska, 3.6; Kansas, 3.6; North Dakota, 3.4; Texas, 3.3; Oklahoma, 3.3; West Virginia, 3.1; and, Mississippi, 3.1. Note that three of Oklahoma's five contiguous states are in the bottom range. For the other two states, Colorado's index is up 6.4 times, while New Mexico's is up 4.7 times. The average among the 50 states and D.C. is 5.5 times with a comparatively high coefficient of variation of 40 percent. Clearly, Oklahoma is near the low end of the spectrum and it is difficult to imagine that such differentials in housing inflation do not impact RPCPI levels over time.

The OFHEO also provides data on the average loan value, and this statistic provides a dollar magnitude that may be an important indicator of how much the typical household has to go into debt to buy a house. This seems, in some ways, to be a better indicator of the average budget impact of owning a home. Local populations also benefit from housing inflation, and

when trading up, may not have to borrow that much in addition to the value of their previous dwelling. Average loan value among the 50 states plus D.C. is $164,000 with a coefficient of variation of 22.7 percent. There appears to be no perfect measure of interstate differentials in housing costs. Until one comes around, it seems useful to concentrate on the average loan value statistic.

## Regression Analysis of RPCPI

Public policy makers need to have an informed understanding of where to place their resources in seeking economic advance of a region. Higher education attainment appears, at face, to have important explanatory power in regional per capita personal income differentials. But, what does the data actually say? Even though there is a very high correlation between college educational attainment and RPCPI (.782 in 1990 and .815 in 2000), correlation does not imply causation. A host of other variables may be involved, such as some already mentioned in this paper. Other variables that might prove important are industry-specific employment structure and climate. While it is difficult to "prove" anything, it will prove useful to see, econometrically, how these various variables "stack-up" against one another in explaining interstate differentials in RPCPI.

The economist relies on the statistical technique of *Regression Analysis* to estimate the marginal effects of independent variables on the explanatory variable, which is, in our case, RPCPI. While it is certainly not the purpose here to provide a tutorial on this widely used statistical technique, a few rudimentary concepts deserve mention. Linear regression analysis begins with a simple linear equation:

$$Y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \varepsilon_i$$

The "Y" variable is the dependent variable and the X variables are the independent or "explanatory" variables; in this example, three of them. The constant term is "α" and the final term "ε" stands for a random-error term. The "β" coefficients are the slope-terms. The theory of regression analysis mathematically demonstrates that each slope-term measures the independent, or marginal, influence of the corresponding variable on the dependent variable, holding constant the values of the other independent variables. Each estimated coefficient has a standard error, an estimate of the statistical variation in the coefficient. The coefficient value divided by the standard error yields the t-statistic. An independent variable is generally regarded as statistically significant if its t-statistic is greater than 2.0 in absolute value. Goodness-of-Fit is measured by a statistic called $R^2$, the percentage of the variation in the dependent variable (Y) that is explained by the regression equation. This statistic is bounded by zero and unity.

The variables we will utilize are:

- RPCPI: Real per capita personal income, measured in thousands of dollars;
- BACH: Percent of the population 25 and older with bachelor's or higher degrees;
- METRO: Percent of the population residing in metropolitan areas;
- MFG: Percent of wage and salary employment in manufacturing;
- FIRE: Percent of wage and salary employment in finance, insurance and real estate;
- GOVT: Percent of wage and salary employment in federal, state, and local government;
- HOUS: Average loan value of house mortgage, in thousands of dollars; and,
- HEAT: Heating degree days, in thousands.[7]

Data will be analyzed for both 1990 and 2003.

There is one very important econometric problem endemic to single-equation form of analysis. This problem is called *simultaneous equations bias*. The RPCPI variable is, in essence, a price variable. The BACH variable is a quantity

variable. From this perspective, we have a simultaneous process: The operation of markets, supply and demand interacting, determine the equilibrium price (RPCPI) and the equilibrium quantity (BACH). From the demand side, it is reasonable to expect a negative coefficient for the BACH variable. Employers, we would suspect, are interested in hiring a more educated work force only if they can obtain it a lower price. Price and quantity are inversely related on the demand side. Industry mix might well be a factor in how much firms are willing to pay.

On the supply side, we would expect the supply price to be positively related to the size of the degreed-adult population. After all, that education comes at extra cost and educated suppliers of labor expect to be rewarded for that expense. The level of urbanization, housing costs, and climatic factors, as potentially (negatively) reflected in the HEAT variable, could also be important variables. The presence of simultaneity can yield biased estimates. The results obtained from single-equation regressions in the presence of simultaneity are, essentially, meaningless.

Econometric theory yields various techniques to deal with problems of simultaneity. One such technique is two-stage least-squares. It is a rather simple technique to employ. In the first step, the predicted values of the variable BACH are computed as a function of remaining predetermined variable. This is known as a reduced-form regression.[8] In the second step, the predicted values are substituted for the BACH variables and the structural equation model is run. The structural model employed here is: RPCPI equals a linear function of BACH, METRO, HOUS, and HEAT. Performing these steps, the following structural model regression results are obtained for 1990 with RPCPI as the dependent variable:

| | *Coefficients* | *Standard Error* | *t Stat* |
|---|---|---|---|
| Intercept | 2.126 | 1.879 | 1.131 |
| BACH90* | 0.716 | 0.227 | 3.156 |
| METRO90 | 0.050 | 0.017 | 2.939 |
| HOUS90 | 0.019 | 0.034 | 0.571 |
| HEAT | 1.060 | 1.381 | 0.767 |

$R^2$ = .812; ; BACH*: Predicted values from a reduced-form equation.

These results indicate that after accounting for simultaneous equations bias, a one percentage point increase in BACH results in a $716 increase in RPCPI. METRO is the only other significant explanatory variable, suggesting, on average, a one percentage point increase in that variable yields a $50 increase in RPCPI. The Goodness-of-Fit measure, $R^2$, shows that about 81 percent of the variation among states in RPCPI is explained by the regression equation.

For year 2003, the following results were obtained:

| | *Coefficients* | *Standard Error* | *t Stat* |
|---|---|---|---|
| Intercept | 5.332 | 2.261 | 2.358 |
| BACH03* | 0.793 | 0.320 | 2.477 |
| METRO03 | 0.020 | 0.028 | 0.723 |
| HOUS03 | 0.001 | 0.044 | 0.023 |
| HEAT | 1.076 | 2.164 | 0.497 |

$R^2$ = .730; BACH*: Predicted values from a reduced-form equation.

In the 2003 results the only statistically significant variable is BACH. It is quite interesting to observe that the marginal effect of BACH is higher but still close to the value of the coefficient obtained in the 1990 results. That is, a one percentage point increase in the share of the adult population with bachelor's or higher degrees yields an average change in RPCPI of about $793. The remaining independent variables have the appropriate signs, but none are statistically significant. Accounting for simultaneous equations bias seems to be quite important in estimation of the impact of higher educational attainment on per capita personal income.

## Conclusion

This paper extensively analyzes real per capita personal income differentials both within the State of Oklahoma and between states. There are six summary statements that follow from the above analyses. First, Oklahoma is not doing all that badly in that the state's inhabitants have participated well in RPCPI advance nationally. Second, differentials both within and without Oklahoma in RPCPI have come down over the broad span of time. Third, there are many reasons why differentials exist among states and regions,

including educational attainment, urbanization, climate, industrial mix, and housing costs. Fourth, one of these more important reasons for existing differentials has to do with the production and utilization of bachelor's and higher degreed personnel in the workforce. Econometric analysis accounting for simultaneous-equation bias has isolated the effect of college educational attainment on RPCPI to be in the range of $720 to $790 per percentage point increase in bachelor's and high degree share of the adult population.

Fifth, the two major metro areas of Oklahoma have the lion's share of degreed population, have been advancing economically at expanding marginal rates, and are likely to continue to do so in the future. Sixth, Oklahoma appears to be "catching up" in many regards, although there is certainly ample room for improvement. While it is certainly extremely difficult to "prove" anything statistically, the evidence in the preliminary econometric analyses presented here is certainly supportive of a public policy that need to pay close attention to size of the degreed population and to seek to identify and implement policies that lead to its augmentation.

## Endnotes

[1]The website for the report is www.ssa.gov/history/reports/boskinrpt.html.

[2]Joel Kotkin, *The New Geography*, New York: Random House, 2000, p. 7.

[3]It may, at first, seem not possible for ratio of the increase in adults with degrees to the total increase in adults to exceed 100 percent. However, if younger entrants to the pool of adults have high degree rates while those who are leaving the pool, through migration or death have low degree rates, it is possible to imagine the ratio exceeding 100 percent.

[4] The metropolitan population pertains to the state population residing in the counties comprising a Metropolitan Statistical Area (MSA). In Oklahoma in the new 2003 definitions, the metropolitan areas are the OKC and Tulsa regions (each consisting of seven counties), Comanche County (Lawton), and Sequoyah County (Ft. Smith MSA).

[5] For example, if an area's average mortgage is $100,000 higher than is typical in the US, at a six-percent rate of interest, 30-year loan, 35 percent marginal tax bracket, and 2.6 persons per household, there would be about $1,800 in additional per-person expenses for home owning households. Such a differential would not apply to the entire region because all households do not own homes. Rental costs, would, however, be expected to be correlated with costs of owning a home.

[6] The website for the Office of Federal Housing Enterprise Oversight is www.ofheo.gov.

[7] Heating degree data for the states are computed by the National Weather Service, Climate Prediction Center, website address www.cpc.ncep.noaa.gov, and are population weighted. To compute heating degree days, the average of the high and low temperatures for each day is subtracted from 65 degrees. This difference, when negative, contributes to the total number of heating degree days. When this difference is positive, that day is called a "cooling degree day" and the magnitude of the difference contributes to total cooling degree days. The sum of the absolute values for days with negative differentials is called "heating degree days." Alaska has the highest at 1.35 thousand heating degree days while Hawaii has zero.

[8]The reduced -form regression results are available from the author on request. Simply write an e-mail message request to Rdauffen@ou.edu.

## Appendix
## Table 1.1

### State Real Per Capita Personal Income and Growth Rates

| Region | 1969 | 1991 | 2004 | Rank 2004 | Ave. Annual Growth Rate '69-'04 | Ave. Annual Growth Rate '91-'04 |
|---|---|---|---|---|---|---|
| United States | 15.189 | 23.846 | 30.524 | | 2.0% | 1.9% |
| Alabama | 10.802 | 19.667 | 25.525 | 42 | 2.5% | 2.0% |
| Alaska | 18.883 | 27.765 | 31.488 | 17 | 1.5% | 1.0% |
| Arizona | 13.768 | 20.691 | 26.430 | 39 | 1.9% | 1.9% |
| Arkansas | 10.303 | 18.130 | 23.764 | 49 | 2.4% | 2.1% |
| California | 17.933 | 26.073 | 32.493 | 12 | 1.7% | 1.7% |
| Colorado | 14.563 | 24.167 | 33.358 | 10 | 2.4% | 2.5% |
| Connecticut | 19.141 | 31.782 | 42.039 | 2 | 2.2% | 2.2% |
| Delaware | 17.466 | 26.481 | 32.850 | 11 | 1.8% | 1.7% |
| District of Columbia | 17.787 | 33.046 | 48.132 | 1 | 2.8% | 2.9% |
| Florida | 14.468 | 23.712 | 29.063 | 25 | 2.0% | 1.6% |
| Georgia | 12.457 | 21.662 | 27.783 | 33 | 2.3% | 1.9% |
| Hawaii | 17.989 | 27.446 | 30.122 | 20 | 1.5% | 0.7% |
| Idaho | 12.825 | 19.216 | 24.794 | 47 | 1.9% | 2.0% |
| Illinois | 17.193 | 25.432 | 32.080 | 14 | 1.8% | 1.8% |
| Indiana | 14.595 | 21.421 | 27.779 | 34 | 1.8% | 2.0% |
| Iowa | 14.476 | 21.343 | 28.611 | 28 | 1.9% | 2.3% |
| Kansas | 14.057 | 22.328 | 28.641 | 27 | 2.0% | 1.9% |
| Kentucky | 11.693 | 19.374 | 25.083 | 45 | 2.2% | 2.0% |
| Louisiana | 11.435 | 19.060 | 25.146 | 43 | 2.3% | 2.1% |
| Maine | 12.398 | 21.010 | 27.690 | 35 | 2.3% | 2.1% |
| Maryland | 16.615 | 27.936 | 36.610 | 5 | 2.3% | 2.1% |
| Massachusetts | 16.634 | 28.090 | 38.895 | 3 | 2.4% | 2.5% |
| Michigan | 16.468 | 23.165 | 29.610 | 23 | 1.7% | 1.9% |
| Minnesota | 14.916 | 24.309 | 33.417 | 9 | 2.3% | 2.4% |
| Mississippi | 9.460 | 16.426 | 22.522 | 51 | 2.5% | 2.4% |
| Missouri | 14.124 | 22.001 | 28.191 | 32 | 2.0% | 1.9% |
| Montana | 12.984 | 19.561 | 25.558 | 41 | 1.9% | 2.1% |
| Nebraska | 14.136 | 22.206 | 29.817 | 21 | 2.1% | 2.3% |
| Nevada | 17.854 | 24.888 | 31.209 | 18 | 1.6% | 1.7% |
| New Hampshire | 14.793 | 25.401 | 33.882 | 7 | 2.4% | 2.2% |
| New Jersey | 17.866 | 29.786 | 38.464 | 4 | 2.2% | 2.0% |
| New Mexico | 11.522 | 18.731 | 24.162 | 48 | 2.1% | 2.0% |
| New York | 18.167 | 28.728 | 35.413 | 6 | 1.9% | 1.6% |
| North Carolina | 12.021 | 21.191 | 27.071 | 37 | 2.3% | 1.9% |
| North Dakota | 12.180 | 19.518 | 27.019 | 38 | 2.3% | 2.5% |
| Ohio | 15.522 | 22.896 | 28.763 | 26 | 1.8% | 1.8% |
| Oklahoma | 12.671 | 19.844 | 25.700 | 40 | 2.0% | 2.0% |
| Oregon | 14.508 | 22.210 | 28.254 | 31 | 1.9% | 1.9% |
| Pennsylvania | 15.086 | 24.293 | 30.724 | 19 | 2.0% | 1.8% |
| Rhode Island | 15.256 | 24.034 | 31.576 | 16 | 2.1% | 2.1% |
| South Carolina | 11.138 | 19.469 | 25.085 | 44 | 2.3% | 1.9% |
| South Dakota | 11.914 | 20.108 | 28.285 | 30 | 2.5% | 2.6% |
| Tennessee | 11.673 | 20.736 | 27.535 | 36 | 2.5% | 2.2% |
| Texas | 13.308 | 21.493 | 28.359 | 29 | 2.2% | 2.1% |
| Utah | 12.247 | 18.571 | 24.893 | 46 | 2.0% | 2.3% |
| Vermont | 13.344 | 21.560 | 29.319 | 24 | 2.2% | 2.4% |
| Virginia | 14.072 | 25.095 | 33.419 | 8 | 2.5% | 2.2% |
| Washington | 16.163 | 24.801 | 32.349 | 13 | 2.0% | 2.0% |
| West Virginia | 11.039 | 18.095 | 23.725 | 50 | 2.2% | 2.1% |
| Wisconsin | 14.833 | 22.246 | 29.620 | 22 | 2.0% | 2.2% |
| Wyoming | 14.124 | 22.393 | 31.594 | 15 | 2.3% | 2.6% |

## Appendix
## Table 1.2
## County Real Per Capital Personal Income

| | | RPCPI ($thousands) | | | | RPCPI Growth Rates | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Area Name** | **Region** | **1969** | **1980** | **1991** | **2003** | **1969-1980** | **1980-1991** | **1991-2003** | **1969-2003** |
| State of Oklahoma | | 12.67 | 18.25 | 19.84 | 25.32 | 3.7% | 0.8% | 2.2% | 2.1% |
| Canadian | OKC | 13.16 | 20.19 | 19.75 | 25.52 | 4.3% | -0.2% | 2.3% | 2.0% |
| Cleveland | OKC | 13.10 | 19.10 | 19.57 | 26.00 | 3.8% | 0.2% | 2.6% | 2.1% |
| Grady | OKC | 11.09 | 16.54 | 16.03 | 21.75 | 4.0% | -0.3% | 2.8% | 2.0% |
| Lincoln | OKC | 11.31 | 15.30 | 15.78 | 19.57 | 3.0% | 0.3% | 2.0% | 1.7% |
| Logan | OKC | 11.22 | 16.73 | 17.38 | 24.86 | 4.0% | 0.4% | 3.3% | 2.4% |
| McClain | OKC | 11.67 | 16.55 | 17.87 | 22.80 | 3.5% | 0.8% | 2.2% | 2.0% |
| Oklahoma | OKC | 15.19 | 21.87 | 22.66 | 29.28 | 3.6% | 0.4% | 2.3% | 2.0% |
| Creek | TUL | 11.23 | 16.36 | 16.76 | 21.05 | 3.8% | 0.2% | 2.1% | 1.9% |
| Okmulgee | TUL | 10.01 | 14.20 | 15.16 | 18.40 | 3.5% | 0.7% | 1.8% | 1.8% |
| Osage | TUL | 11.86 | 16.70 | 16.11 | 21.53 | 3.4% | -0.4% | 2.6% | 1.8% |
| Pawnee | TUL | 11.91 | 17.09 | 17.23 | 20.29 | 3.6% | 0.1% | 1.5% | 1.6% |
| Rogers | TUL | 12.88 | 18.07 | 19.24 | 23.41 | 3.4% | 0.6% | 1.8% | 1.8% |
| Tulsa | TUL | 15.95 | 23.40 | 26.05 | 33.61 | 3.8% | 1.1% | 2.3% | 2.3% |
| Wagoner | TUL | 10.20 | 16.26 | 17.52 | 21.07 | 4.7% | 0.7% | 1.7% | 2.2% |
| Adair | NE | 7.42 | 10.10 | 14.08 | 17.80 | 3.1% | 3.3% | 2.1% | 2.7% |
| Cherokee | NE | 8.15 | 11.61 | 17.25 | 18.60 | 3.5% | 4.0% | 0.7% | 2.5% |
| Craig | NE | 10.62 | 15.57 | 15.66 | 21.55 | 3.8% | 0.1% | 2.9% | 2.1% |
| Delaware | NE | 8.10 | 11.07 | 15.78 | 22.03 | 3.1% | 3.5% | 3.0% | 3.0% |
| Kay | NE | 14.39 | 21.41 | 22.04 | 23.81 | 4.0% | 0.3% | 0.7% | 1.5% |
| Mayes | NE | 10.69 | 14.86 | 16.29 | 20.14 | 3.3% | 0.9% | 1.9% | 1.9% |
| Muskogee | NE | 10.99 | 15.44 | 16.09 | 20.86 | 3.4% | 0.4% | 2.4% | 1.9% |
| Noble | NE | 10.31 | 17.52 | 17.01 | 21.26 | 5.3% | -0.3% | 2.0% | 2.2% |
| Nowata | NE | 10.61 | 16.16 | 15.65 | 17.21 | 4.2% | -0.3% | 0.9% | 1.5% |
| Ottawa | NE | 11.19 | 14.50 | 16.86 | 19.70 | 2.6% | 1.5% | 1.4% | 1.7% |
| Payne | NE | 9.44 | 13.73 | 17.32 | 21.26 | 3.8% | 2.3% | 1.9% | 2.5% |
| Washington | NE | 17.21 | 25.57 | 26.59 | 28.42 | 4.0% | 0.4% | 0.6% | 1.5% |
| Alfalfa | NW | 12.14 | 16.76 | 16.72 | 22.90 | 3.2% | 0.0% | 2.9% | 1.9% |
| Beaver | NW | 13.68 | 21.87 | 18.86 | 23.69 | 4.7% | -1.5% | 2.1% | 1.7% |
| Blaine | NW | 10.63 | 14.98 | 16.04 | 20.10 | 3.4% | 0.7% | 2.1% | 1.9% |
| Cimarron | NW | 13.42 | 14.69 | 24.95 | 20.21 | 0.9% | 5.3% | -1.9% | 1.2% |
| Custer | NW | 11.52 | 15.93 | 17.97 | 21.36 | 3.2% | 1.2% | 1.6% | 1.9% |
| Dewey | NW | 10.18 | 15.84 | 18.05 | 23.85 | 4.4% | 1.3% | 2.5% | 2.6% |
| Ellis | NW | 12.63 | 18.82 | 19.18 | 24.00 | 4.0% | 0.2% | 2.0% | 1.9% |
| Garfield | NW | 13.53 | 20.77 | 20.84 | 24.70 | 4.3% | 0.0% | 1.5% | 1.8% |
| Grant | NW | 12.58 | 18.47 | 19.84 | 26.72 | 3.8% | 0.7% | 2.7% | 2.3% |
| Harper | NW | 12.33 | 16.95 | 19.93 | 30.56 | 3.2% | 1.6% | 3.9% | 2.8% |
| Kingfisher | NW | 11.82 | 19.29 | 19.38 | 26.06 | 4.9% | 0.0% | 2.7% | 2.4% |
| Major | NW | 12.15 | 14.95 | 17.12 | 22.61 | 2.1% | 1.4% | 2.5% | 1.9% |
| Roger Mills | NW | 9.66 | 12.65 | 15.81 | 23.31 | 2.7% | 2.2% | 3.5% | 2.7% |
| Texas | NW | 15.39 | 19.10 | 21.33 | 23.90 | 2.2% | 1.1% | 1.0% | 1.3% |
| Woods | NW | 10.71 | 16.01 | 18.01 | 24.18 | 4.0% | 1.2% | 2.7% | 2.5% |
| Woodward | NW | 12.11 | 18.95 | 16.88 | 20.45 | 4.5% | -1.2% | 1.7% | 1.6% |
| Atoka | SE | 7.45 | 9.56 | 11.70 | 17.01 | 2.5% | 2.0% | 3.4% | 2.5% |
| Bryan | SE | 8.57 | 12.51 | 15.25 | 20.42 | 3.8% | 2.0% | 2.7% | 2.6% |
| Carter | SE | 11.19 | 18.10 | 19.34 | 22.35 | 4.8% | 0.7% | 1.3% | 2.1% |
| Choctaw | SE | 8.65 | 11.99 | 13.99 | 18.25 | 3.3% | 1.5% | 2.4% | 2.3% |
| Coal | SE | 8.06 | 10.46 | 12.72 | 15.90 | 2.6% | 2.0% | 2.0% | 2.1% |
| Garvin | SE | 9.96 | 17.12 | 17.61 | 21.85 | 5.4% | 0.3% | 2.0% | 2.4% |

## Appendix
## Table 1.2 (continued)
## County Real Per Capital Personal Income

| | | RPCPI ($thousands) | | | | RPCPI Growth Rates | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Area Name** | **Region** | **1969** | **1980** | **1991** | **2003** | **1969-1980** | **1980-1991** | **1991-2003** | **1969-2003** |
| Haskell | SE | 8.46 | 12.98 | 14.05 | 20.30 | 4.3% | 0.8% | 3.3% | 2.7% |
| Hughes | SE | 9.07 | 12.24 | 14.10 | 17.41 | 3.0% | 1.4% | 1.9% | 2.0% |
| Johnston | SE | 7.73 | 11.04 | 12.36 | 18.32 | 3.6% | 1.1% | 3.6% | 2.6% |
| Latimer | SE | 7.60 | 11.07 | 14.30 | 20.71 | 3.8% | 2.6% | 3.4% | 3.0% |
| LeFlore | SE | 8.71 | 12.28 | 14.70 | 19.74 | 3.4% | 1.8% | 2.7% | 2.5% |
| Love | SE | 9.16 | 15.07 | 17.27 | 20.56 | 5.0% | 1.4% | 1.6% | 2.4% |
| Marshall | SE | 8.88 | 13.45 | 15.67 | 19.41 | 4.2% | 1.5% | 1.9% | 2.4% |
| McCurtain | SE | 7.63 | 11.44 | 14.56 | 19.46 | 4.0% | 2.4% | 2.6% | 2.8% |
| McIntosh | SE | 7.37 | 11.71 | 14.22 | 18.89 | 4.6% | 1.9% | 2.6% | 2.9% |
| Murray | SE | 9.54 | 13.81 | 15.30 | 19.36 | 3.7% | 1.0% | 2.1% | 2.1% |
| Okfuskee | SE | 8.39 | 12.10 | 12.63 | 16.31 | 3.7% | 0.4% | 2.3% | 2.0% |
| Pittsburg | SE | 10.11 | 13.15 | 15.80 | 20.59 | 2.6% | 1.8% | 2.4% | 2.2% |
| Pontotoc | SE | 10.38 | 15.81 | 16.89 | 21.25 | 4.2% | 0.7% | 2.1% | 2.2% |
| Pottawatomie | SE | 11.81 | 17.04 | 17.04 | 21.38 | 3.7% | 0.0% | 2.1% | 1.8% |
| Pushmataha | SE | 7.52 | 9.56 | 12.29 | 17.56 | 2.4% | 2.5% | 3.2% | 2.6% |
| Seminole | SE | 9.01 | 15.48 | 15.31 | 18.67 | 5.4% | -0.1% | 1.8% | 2.2% |
| Sequoyah | SE | 8.67 | 12.03 | 14.80 | 18.93 | 3.3% | 2.1% | 2.2% | 2.4% |
| Beckham | SW | 10.97 | 15.33 | 15.67 | 20.09 | 3.3% | 0.2% | 2.3% | 1.8% |
| Caddo | SW | 9.66 | 13.62 | 15.84 | 18.96 | 3.4% | 1.5% | 1.6% | 2.0% |
| Comanche | SW | 11.66 | 15.14 | 18.82 | 24.21 | 2.6% | 2.2% | 2.3% | 2.2% |
| Cotton | SW | 11.20 | 13.68 | 17.32 | 21.95 | 2.0% | 2.4% | 2.2% | 2.0% |
| Greer | SW | 9.19 | 12.40 | 16.76 | 21.65 | 3.0% | 3.0% | 2.3% | 2.6% |
| Harmon | SW | 10.39 | 10.78 | 14.16 | 21.06 | 0.4% | 2.7% | 3.6% | 2.1% |
| Jackson | SW | 11.28 | 14.32 | 17.07 | 23.73 | 2.4% | 1.8% | 3.0% | 2.3% |
| Jefferson | SW | 9.73 | 13.91 | 15.98 | 18.45 | 3.6% | 1.4% | 1.3% | 1.9% |
| Kiowa | SW | 9.93 | 13.89 | 15.86 | 21.46 | 3.4% | 1.3% | 2.7% | 2.3% |
| Stephens | SW | 11.97 | 18.77 | 17.67 | 22.78 | 4.5% | -0.6% | 2.3% | 1.9% |
| Tillman | SW | 10.58 | 12.37 | 13.84 | 18.51 | 1.6% | 1.1% | 2.6% | 1.7% |
| Washita | SW | 15.89 | 13.81 | 15.52 | 19.40 | -1.4% | 1.2% | 2.0% | 0.6% |

## Appendix
## Table 1.3
## Regional Population

### A. Regional Population

| | 1969 | 1980 | 1991 | 2003 |
|---|---|---|---|---|
| OKC | 697,691 | 877,354 | 983,942 | 1,133,283 |
| TUL | 567,032 | 715,729 | 774,765 | 879,914 |
| NE | 341,841 | 405,058 | 409,634 | 449,270 |
| NW | 199,738 | 222,052 | 199,043 | 196,820 |
| SE | 435,060 | 516,581 | 521,068 | 565,406 |
| SW | 293,638 | 303,984 | 286,988 | 281,776 |
| Total | 2,535,000 | 3,040,758 | 3,175,440 | 3,506,469 |

### B. Regional Shares of Oklahoma Population

| | 1969 | 1980 | 1991 | 2003 |
|---|---|---|---|---|
| OKC | 27.5% | 28.9% | 31.0% | 32.3% |
| TUL | 22.4% | 23.5% | 24.4% | 25.1% |
| NE | 13.5% | 13.3% | 12.9% | 12.8% |
| NW | 7.9% | 7.3% | 6.3% | 5.6% |
| SE | 17.2% | 17.0% | 16.4% | 16.1% |
| SW | 11.6% | 10.0% | 9.0% | 8.0% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% |

### C. Shares of Growth Relative to Base Year

| | 1969 Base | 1980 Base | 1991 Base |
|---|---|---|---|
| OKC | 44.8% | 55.0% | 45.1% |
| TUL | 32.2% | 35.3% | 31.8% |
| NE | 11.1% | 9.5% | 12.0% |
| NW | -0.3% | -5.4% | -0.7% |
| SE | 13.4% | 10.5% | 13.4% |
| SW | -1.2% | -4.8% | -1.6% |
| Total | 100.0% | 100.0% | 100.0% |

## Appendix
## Table 1.4
## Regional Wage and Salary Employment

### A. Regional Total Employment

| | 1969 | 1980 | 1991 | 2003 |
|---|---|---|---|---|
| OKC | 293,491 | 432,672 | 464,498 | 570,046 |
| TUL | 213,522 | 331,827 | 355,884 | 416,321 |
| NE | 100,230 | 138,998 | 146,163 | 162,572 |
| NW | 60,244 | 83,342 | 74,324 | 79,176 |
| SE | 102,659 | 140,184 | 152,096 | 185,319 |
| SW | 104,083 | 112,105 | 104,599 | 113,915 |
| State | 874,229 | 1,239,128 | 1,297,564 | 1,527,349 |

### B. Regional Shares of Oklahoma Total Employment

| | 1969 | 1980 | 1991 | 2003 |
|---|---|---|---|---|
| OKC | 33.6% | 34.9% | 35.8% | 37.3% |
| TUL | 24.4% | 26.8% | 27.4% | 27.3% |
| NE | 11.5% | 11.2% | 11.3% | 10.6% |
| NW | 6.9% | 6.7% | 5.7% | 5.2% |
| SE | 11.7% | 11.3% | 11.7% | 12.1% |
| SW | 11.9% | 9.0% | 8.1% | 7.5% |
| Total | 100.0% | 100.0% | 100.0% | 100.0% |

### C. Shares of Growth Relative to Base Year

| | 1969 Base | 1980 Base | 1991 Base |
|---|---|---|---|
| OKC | 42.3% | 47.7% | 45.9% |
| TUL | 31.1% | 29.3% | 26.3% |
| NE | 9.5% | 8.2% | 7.1% |
| NW | 2.9% | -1.4% | 2.1% |
| SE | 12.7% | 15.7% | 14.5% |
| SW | 1.5% | 0.6% | 4.1% |
| Total | 100.0% | 100.0% | 100.0% |

**CHAPTER 2**

**Alexander Holmes***

# A Taxpayer Bill of Rights and the Debate Over the Size of Government

## Introduction

Throughout history, societies have first debated the rationale for the existence of a government, then the form of the government, and finally the functions that the government should perform. Once it is established that a) there ought to be a government of some particular form and b) that it ought to perform some particular function or functions, framers must then decide how to fund these activities and at what level the services ought to be provided. Embedded in the debate is the notion that a government, by its very existence, must be provided the ability to separate citizens from some portion of their income and wealth. Indeed, the core concept of a "government" is this unique power to withdraw resources from the private sector for use in the pubic sector. Within a democratic framework, the people cede to their representatives power over their purses; i.e. taxation *with* representation. A taxpayer bill of rights questions this assumption by demanding that restrictions be placed on the ability of elected representatives to set the level of taxation.

The debate that surrounds the so-called taxpayer's bill of rights (TABOR), recently endorsed by approximately some 290,000 to 300,000 Oklahoman's through their signatures to place State Question 726 on the ballot[1], is not about budget priorities or which function or functions of government are appropriate for the state. Instead, it is a question of what metrics ought to define the absolute magnitude of government. Assumed by State Question 726 is the notion that a state government has an "optimal" size when measured by some, but not all, of its revenue sources.

As proposed in State Question 726, the state government of Oklahoma will be at its optimal size if limited to grow at a rate equal to no more than the sum of the rate of inflation, as defined by the consumer price index of the Bureau of Labor Statistics, plus the rate of growth of the population, as defined by the U. S. Census Bureau. While it might be logical to assume that if revenue growth due to economic activity does not sustain this level of government then the resulting size of government is "sub-optimal", there is no presumption of this in State Question 726. Indeed, as written, if an economic downturn should occur, reducing state revenues, the base upon which future growth would be measured decreases. This creates a ratchet effect lowering future limits. This implies that the optimal size of government ought to be lower under this economic situation. Given this, the contention that State Question 726 will result in the optimal size of the Oklahoma state government is very much in doubt.

But State Question 726 has a different pedigree than the search for the optimal size of government. State Question 726 has its historical roots in previous efforts — in Oklahoma and elsewhere — to limit government and maintain or reduce tax burdens. Tax and expenditure limits, known as TELs, have been enacted in a variety of forms, in a number of states dating as far back as 1906 in Oklahoma. Currently more than 30 states, including Oklahoma, have some form of TEL. What is unique about the current effort is the proposed formula, although this too is not an entirely novel proposal.

This article first discusses the concept of a taxpayer's bill of rights in the context of the meaning of individual rights and societal rights, also examining current taxpayer rights under Oklahoma tax law. Second, current Oklahoma tax limitation provisions will be discussed along with constraints on the legislature in the area of taxation policy. Next the specifics of the proposed Oklahoma TABOR, its similarities to the Colorado

TABOR (suspended in 2005), and estimated budgetary implications for Oklahoma under a TABOR will be presented. The final section presents a summary and conclusions of the analysis.

## Existing Individual Taypayer's Rights in Oklahoma

The so-called taxpayer's bill of rights presents a curious concept of the term "right", albeit an effective use of the phrase for its purpose. Rights as we have come to know them derive their power and source from either statute or constitution and apply to individuals, or at least "legal" individuals. Our rights are defined and refined by the courts as they hear cases brought by individuals. Classes of individuals may be found to have rights, but only as they are individuals within the class. "Society" itself has no standing and thus has no "rights", per se. The Oklahoma TABOR proposal confers no rights on taxpayers as individuals, but rather confers on society a so-called right to a limited government, limited in terms of the revenues available for appropriation.

Oklahoma taxpayers, as individuals, currently do have rights as they face the tax collector. These are embodied in the state constitution and in various statutes and rules adopted by the Oklahoma Tax Commission and other taxing authorities; they are published through the Administrative Procedures Act. At the core of these provisions, constitutional, statutory, and by rule, is the concept that all taxpayers in like circumstances, as it concerns the specific tax, will be treated alike. The state constitution specifically makes this clear in Article X § 5, "Taxes shall be uniform on the same class of subjects". With respect to property taxation, the constitution again reiterates this concept in Article X § 22 "Nothing in this Constitution shall be held, or construed, to prevent the classification of property for purposes of taxation; and the valuation of different classes by different means or methods".

The Oklahoma Tax Commission has adopted a detailed set of rules that provide individuals with rights to protest any of the various taxes they pay.[2] The Oklahoma Statutes provide for individuals to protest their tax by statute in the Uniform Tax Procedure Code of Title 68 O.S. §§ 201 et. seq., except for the income tax that is addressed in Article 23 of Title 68, and the estate tax, which is addressed in Article 8 of Title 68. For property tax matters the statutes provide for a special Court of Tax Review to hear protests that have come from lower courts and local hearings before county equalization boards. Public service property protests are heard first before the State Equalization Board, then the Court of Tax Review, and finally the State Supreme Court.

At every step through the administrative procedures and appeals to the courts, the taxpayer retains legal rights to the fair application of taxes to their particular case. But what is at stake is the application of the tax to the taxpayer, *not* the level of taxation or the very existence of the tax. These matters fall to the representatives of the people, the legislature, to determine if such a tax ought to be levied and the level of the levy. If a levy has been set according to applicable laws, no court will overturn a taxpayer's levy simply because it is "too high" in the eyes of the taxpayer. Indeed, the Oklahoma state supreme court has ruled that it is the sole province of the legislature to set taxes and to determine if, as a matter of public policy, there ought to be different classes of taxpayers.[3] The proposed TABOR adds nothing to an individual's rights as it comes to taxation, but rather creates a "right" to a given level of government, defined in terms of revenues, that is to be imposed on all citizens. In this sense society as a whole is granted this "right" through a constitutional restriction on the ability of the legislature to spend revenues above a certain level.

## Current Tax And Expenditure Limitations in Oklahoma

While the proposed TABOR can not be seen as an effort to confer any new rights on individuals, it certainly can be viewed as an effort to limit the size of the state government by limiting the ability to spend revenues. Since statehood, Oklahoma has placed limits on a variety of revenue sources by placing limits on tax rates. By statute[4],

and later by constitutional amendment[5], the property tax millage rate is capped. At the time of these millage limits, the property tax played a much more significant role in funding government services and thus constituted a real limit on government revenues. With the abolition of the state-wide property tax in 1933 and the increased role of the state government in providing services, these limits have a diminished effect on limiting government. Nevertheless, other, more recent limits have been put in place to limit property tax revenues.[6]

The abolition of the state-wide property tax and the imposition of a state sales tax in 1937, coupled with the devastating effects of the Great Depression, caused the state government to engage in deficit financing. By 1941 it was clear that to maintain a balanced budget, the state required a limitation on spending. By constitutional amendment, such a limitation was put in place in 1941 (Article X, § 23). This balanced budget amendment has been amended several times with the most dramatic change occurring in 1985. This form of the balanced budget amendment required the setting of spending limits on the legislature through the use of revenue estimates, rather than the use of formulas — as had been the practice in the past. It also set a limit that provided for an assumed error of five percent, limiting the legislature to appropriate 95 percent of the estimate. All revenues that might accrue above the appropriation limit would flow into the general fund and could be appropriated only when realized. Revenues that accrued above the estimate would flow into a constitutional reserve fund and could only be appropriated if the legislature, upon request of the governor, declared an "emergency".

In 1985, a second expenditure limit was built into the balanced budget amendment. Regardless of the estimated revenues certified by the State Equalization Board, the increase in the amount certified for appropriation "could not exceed 12 percent adjusted for inflation".[7] Annually, since 1985, the State Board of Equalization meets "within 5 days after the monthly apportionment in February of each year" to provide the final certification of the funds available for appropriation and the calculation of this spending limit is included. In practice, to determine if this is a binding limit on appropriations, the certification computes the spending limit using the Bureau of Labor Statistics national inflation rate. In no year since 1985 has this been a binding limit. In comparing the current spending limit to that proposed by TABOR advocates, it is clear that if population growth in Oklahoma is less than 12 percent the proposed TABOR could have an effect on the magnitude of the available funds for appropriation. Indeed, for each percentage point that population growth is less than 12 percent the greater the potential magnitude of the constraint.

An important second difference between the existing expenditure limit and the proposed TABOR is what is to be done if the constraint is reached. Under the current constitutional constraint, the legislature is limited to spending the revenues available for appropriations in the *current* year, but funds above the constraint could be spent in subsequent years from the Constitutional Reserve Fund, which is where these "excess" funds are deposited.[8] Under the TABOR proposal, at least some of these "excess" funds would be returned to the taxpayer, as discussed below.

Perhaps the most potent limit on Oklahoma legislative prerogatives, when it comes to taxation, is contained in Article V, § 33, commonly referred to as State Question 640. Placed through initiative petition in the state constitution in 1992, this provision limits the ability of the legislature to pass "revenue bills" without an affirmative vote of the people in the next general election. A revenue bill may, however, become effective without referral to the people if it is passed with a supermajority vote in both houses (3/4 vote) and signed by the governor. Debate continues as to what constitutes a "revenue bill", but no cases have been filed seeking judicial review. In at least one unchallenged case, the tax base was expanded without the supermajority vote in the legislature and fees have been instituted in circumstances where one might consider them a form of taxation, i.e. a "revenue bill". In practice, however, no tax bill of any consequence has been passed without referral to the people, and in all cases of referred taxes, the tax was rejected.[9] Without doubt, State Question 640's tax limiting mechanism has provided a significant constraint on the growth of

government. What is left undone, then, is a mechanism to limit State government growth that develops because of increases in economic activity.

## The Proposed TABOR for Oklahoma

As discussed above, Oklahoma already has an expenditure limit in her state constitution; albeit one that places the limit at a high level. Oklahoma also effectively limits property taxes through millage levy caps and limits on appraisal increases. Moreover, at the state level, State Question 640 provides for even greater limits. What the proposed TABOR will actually limit is the ability of the state to spend revenues that accrue as a result of economic growth and development.

The current balanced budget amendment, Article X, § 23 operates as follows. Two certifications of funds for appropriation are made for each fiscal year. The first is made "not more than 45 days or less than 35 days prior to the convening of each regular session of the Legislature" which usually occurs around Thanksgiving: the legislature is set to convene the first week of January for its regular session. It became apparent that the importance of the Christmas season on revenues, and the delay in data required for estimating revenues, made for potential errors in the estimates. Therefore, a second and final certification was added that must occur "within 5 days after the monthly apportionment in February of each year". This estimate is final, with the exception of modifications resulting from changes in any new law that might affect revenues. The finality of this estimate is important in providing discipline to both the governor and legislature in forming budget priorities: new revenue "estimates" can not be created to meet pressures on the budget.

The revenues are estimated on the basis of economic circumstances, drawing upon various economic models' forecasts of future growth, prices of oil and natural gas, interest rates and other variables that would impact the state's economic health and thus state revenues. Once the revenue estimate is certified it is reduced by 5 percent and this becomes the maximum that can be appropriated by the legislature from the state's general revenue fund. As discussed, if this figure is greater than 12 percent plus inflation above the last year's certified level then this cap will prevail on the final certification. All appropriations above the certified cap are "null and void".

It is important to note that much of the state's spending is *not* appropriated from the general revenue fund. Indeed, the percentage of total state spending that comes from appropriated dollars fell from 49 percent in 1999 to 37 percent in 2004. In Oklahoma, as in many but not all states, federal funds are not appropriated. Dedicated revenues, such as motor fuel taxes, are not appropriated and fee revenues such as university and college tuition are not appropriated. In all, in 2005 only 39 percent of all state spending was appropriated by the legislature, even after excluding expenditures from the retirement trust funds. The TABOR debate thus centers on this 39 percent of all state spending.

Article X, § 23 provides that the so-called "5% money", that is revenues above the certified level for appropriations but less than the estimated revenues, will accrue to the general revenue fund and may be appropriated at any time that such funds exist, usually after the close of the fiscal year on June 30. These funds are simply cash in the general revenue fund and need no certification because the purpose of certification is to provide an estimate of future available revenues. Cash, by its very nature, needs no estimate of potential availability. Revenue above the certified "itemized estimate [of revenues] made by the State Board of Equalization", which is above the 100% of estimated revenues, is deemed "surplus funds" and is directed into the Constitutional Reserve Fund. At the beginning of each fiscal year up to one-half of the Constitutional Reserve Fund may be appropriated if there is a decline from year to year in the certification level. Up to one-half of the Constitutional Reserve Fund may be appropriated if the governor declares an emergency and 2/3 of both the house and senate concur. In practice what constitutes an "emergency" is subject only to the conscience of each legislator as he or she votes on the declaration. In past years, the Constitutional Reserve Fund has been used for appropriations much like any other revenues held in the General

Revenue Fund with little or no distinction as to the source of the funds. This practice resulted in a change in 2005. Under State Question 708, three-quarters of the Constitutional Reserve Fund is off limits, except in cases of a revenue shortfall. Once the Constitutional Reserve Fund reaches 10 percent of the General Revenue Fund, it is deemed "full" and all revenues flow once again back to the General Revenue Fund. The creation of the Constitutional Reserve Fund was a response to the dramatic variability in Oklahoma's revenue collections as a result of the oil boom of the late 1970's and early 1980's and the collapse that followed. The Constitutional Reserve Fund is often referred to as the Rainy Day Fund for this reason.

Oklahoma's balanced budget amendment operates to restrain the legislature from imprudent spending relative to the best estimates of future revenue. It also provides for a cap on spending, but one that has been moot in its 20 year history. The purpose of Article X, § 23 was never really designed in any seriousness to limit the size of state government, but rather to maintain the fiscal integrity of the state, balancing revenues with appropriations. But it is this section of the state constitution that would be amended under the proposed TABOR, thus requiring this detailed discussion of its current features.

The proposed TABOR would dramatically amend Article X, § 23, in many ways negating its original intent as a mechanism to insure a balanced budget. As proposed, the State Board of Equalization is called upon to certify an estimate of revenues "during the last preceding fiscal year" and also to set a State Spending Limit. The State Spending Limit [for the *next* fiscal year] is determined by increasing the previous "state fiscal year's *spending*" by the percentage increase in population plus the percentage increase in inflation. If this results in a decline in the spending limit the previous year's spending limit applies. Surplus funds are defined as all revenues that accrue to any fund appropriated by the legislature above the State Spending Limit. These surplus funds are to be deposited to the newly created Constitutional Emergency Fund until it reaches 5 percent of the State Spending Limit. Appropriations may be made from the Constitutional Emergency Fund only if both houses concur. The proposal is silent on whether appropriations from the Constitutional Emergency Fund may be made if they would violate the State Spending Limit, thus it would seem that the State Spending Limit would be controlling. If this is the case, then it would seem that no circumstances could arise that would allow appropriations from the Constitutional Emergency Fund, particularly in light of the language that specifically prohibits a failure of revenue to constitute an "emergency". The proposal allows any declaration of an "emergency" to be challenged by any citizen in any court in Oklahoma.

Once the Constitutional Emergency Fund reaches 5 percent of the State Spending Limit, "up to 50 percent" of other surplus revenues are to be deposited to the Budget Stabilization Fund until it reaches 10 percent of the State Spending Limit. If a budget failure occurs in the General Revenue Fund, then the Budget Stabilization fund may be used, up to a limit of 35 percent of the Budget Stabilization Fund. All revenues in excess of the above deposits are to be returned proportionately to all people who filed a personal income tax return in the previous year. The State Spending Limit may be suspended one fiscal year at a time and only upon a vote of the people. The State Spending Limit may also be adjusted to incorporate increases in taxes that have been placed before the people in accordance with Article V, § 33, the State Question 640 provisions. Article V, § 33 provides for tax increases *without* a vote of the people, but the framers of the TABOR proposal do not allow for an increase in the State Spending Limit under this circumstance.

The TABOR proposal also makes provisions against the possibility that the legislature may shift the burden of responsibility from the state government to local units of government. Indeed, Section 12 of the proposal seems to be a different subject from the subject of the balanced budget process for the state government. Section 12 addresses the issue of the state's obligation to fund activities of local governments. The state is mandated to maintain the current level of such funding and to fund any obligations that may be required in the future. Examples of such regulations would include water quality, county bridge

and road specifications, jail space and a variety of health and safety programs such as sanitary landfills, and police and firefighter training. The state has mandated minimum standards in a number of these areas without providing funds on the grounds that these are local services, but have broader implications and thus require uniform standards of delivery. If one were to properly view school districts as local units of government then all mandates for minimum quality standards, including the federally required No Child Left Behind Act, also would fall under Section 12 of this proposal. In effect, this section of the TABOR proposal requires a dramatically increased role for the state government in funding local public services while simultaneously limiting the ability of the state to spend on these local functions of government.

The TABOR proposal goes to great lengths to define "fiscal year spending" and also "total state revenue". The State Spending Limit is based on the definition of fiscal year spending and includes only appropriated spending. The major items excluded from "state spending" are appropriations funded by the federal government and appropriations for unemployment and disability insurance and pension funds. Currently, the state appropriates no funds for pensions and does not appropriate federal funds as is done in some states. It is unclear if appropriations to *match* federal funds are included in this exclusion. If so, then a significant part of state monies are excluded, including all of the state share of Medicaid, all Temporary Assistance for Needy Families (TANF) program funds, and a number of other state-federal programs.

The TABOR proposal also defines "total state revenue" with exclusions. The major categories here are all federal funds and earnings on endowment funds, trust funds, and pension funds. Importantly included would be payments made by participants in the various pension funds and all fees, including fees and tuition paid to the state's universities and colleges, admission charges to the various state parks and recreation areas, and revenues paid for services rendered by the state to local units of government. This includes all revenues paid to the Firefighters and Police Pension Funds and on behalf of county employees in the Oklahoma Public Employees Retirement System. While the basic computation of the State Spending Limit is usually based on spending, in section 1 b (ii) the State Spending Limit is determined not by spending but by state revenues. The effect of these inclusions in the definition of "total state revenues" is to increase the size of state revenues that determine the State Spending Limit under this section, even though none of these funds are appropriated dollars.

The proposed TABOR also seems to contain inconsistencies that would make it operationally impossible or at least awkward and open to interpretation. The State Equalization Board is charged with setting the State Spending Limit based upon total state spending in the *preceding* fiscal year. The first meeting of the State Board would be sometime in late November, not even half way through the fiscal year when certainly no certification could be made of total state spending for the *current* fiscal year. One must then assume that "preceding" means the fiscal year that ended the preceding June 30. This interpretation would mean that the State Spending Limit would lag actual state spending by two years.

## Estimated Impacts of the Proposed TABOR in Oklahoma

Even with the questions raised above, there is some interest as to what the effects of the proposed TABOR might be in Oklahoma. Rather than estimate future revenues and compute the State Spending Limit under such a scenario, it has seemed prudent to look backwards to see how past spending might have been affected. Such estimates assume that all other variables remain unchanged and that policies enacted during the past would have been enacted. Given the significant reductions in taxes that have been enacted during this period, including the tax rebate, this may be a heroic assumption. Further, given the difficulty of determining the effect of Section 12 – requiring the state to fund all local services at current state levels and fully fund mandates to local units of government – this impact has been excluded in all the work to date, although its effect

on the level of *state* services would no doubt be dramatic.

At least two simulations of the proposed TABOR have been published and widely circulated and quoted.[10] Both begin with an array of assumptions, the first being that the proposed TABOR was in effect in 1991, the same year Colorado adopted its TABOR. Barry Poulson simulates two scenarios, one that includes further assumptions as to the disposition of funds during the period of economic distress for states that began in 2000. The Community Action Project and Citizens Policy Center simulates the impact of a TABOR under a single scenario that excludes the potential actions of the legislature in times of economic downturn and makes no assumptions as to the disposition of "surplus" funds during periods where revenue growth is above the State Spending Limit. Curiously, Poulson bases his comparisons of the effect of a TABOR on state general fund revenue rather than state general revenue fund appropriations – the definition used by the Community Action Project and Citizens Policy Center and the one required under the proposed TABOR. This difference is important because the state used significant funds from the previously built-up Constitutional Reserve Fund to stabilize the budget in 2000/2001. The result is dramatically different conclusions when comparing the actual appropriation level to those that would occur under a TABOR. For example, Paulson estimates a difference between actual appropriations (General Fund Revenues) and TABOR limits of $156 million for 2003 (that is, the legislature would have been allowed to spend $156 million dollars less than they did), while OCAP estimates a difference of $785 million for the same year. The reason is not the small difference in their estimated TABOR limit, $19 million, but the difference between OCAP's use of actual appropriations of $5,191 million in 2003 and Poulson's use of General Fund Revenues of only $4,581.

In order to produce an independent estimate of the potential effects of a TABOR a similar scenario was produced by this author beginning the analysis five years in the past. The results demonstrated the difficulty of reaching any definitive answers to the question of TABOR's impact and further demonstrated the dramatic effect of the choice of the beginning time period. The size of the restrictions in state spending varied as much as 40 percent year to year when looking at a 5 year period as compared to a 10 year period, keeping the definitions of state spending the same. That is to say that all estimates of the impact of a TABOR in Oklahoma are very sensitive to the problem of the choice of the base year.

Of perhaps even greater concern when using past spending or revenue levels is the assumption that no policies would have been changed under a TABOR constraint. As has been demonstrated repeatedly, State Question 640 has played an important role in the drafting of tax legislation. Revenue triggers were put in place that would reinstitute tax cuts under certain revenue scenarios because of the assumed impossibility to recapture these revenues in the future. Tax rebates are used rather than tax cuts for the same reason and tax reform is stalled because of the limits on tax policy changes imposed by State Question 640.[11] It is difficult to imagine the tax rebates and the plethora of special interest tax cuts provided in recent years in a world of TABOR spending constraints. Nevertheless, all such past policies are contained in any estimate of the impact of an Oklahoma TABOR based on past data. This includes as an "expenditure" the appropriation for the $93 million tax rebate in fiscal year 2006 which would count against the State Spending Limit. What one can say with some certainty is that a TABOR in Oklahoma would have a significant impact on the funds available to support state government services.

## The Colorado TABOR Experience

As discussed above, tax and expenditure limits, TELs, are not new to state governments. What perhaps is new is the renewed efforts to institute TELs that require a formula directly affecting state spending rather than tax increases. Wisconsin has been seriously discussing a TABOR and introduced such a measure in 2002, but later withdrew the proposal for study. Kansas has a TABOR proposal pending. California, this past November rejected a TABOR-like proposal, Proposition 76, the "Live Within Our Means Act",

which was really more like a balanced budget amendment than a true TABOR. In all, some 23 states have made or are considering some TABOR proposal based on the inflation plus population growth formula or some variant of that. The current impetus seems to come from the efforts of Citizens for a Sound Economy headed by former U.S. Representative Dick Armey which advocates the formula approach to limiting state spending.

The most recent successful effort to institute a TABOR has been in Colorado, the state whose TABOR is the one upon which the Oklahoma TABOR is based. Instituted as a state constitutional amendment in 1992 as Article X, section 20(1), the Colorado TABOR applied to all levels of government; state, city, local and even special districts. Of some interest is the fact that the Colorado TABOR instituted nearly the same restriction on tax increases as Oklahoma's State Question 640 adopted in 1992, the same year as Colorado's TABOR. Colorado's TABOR, like the proposal in Oklahoma, also limits spending using the same formula of population plus inflation growth. A similar formula is applied to Colorado's local units of government except that it replaces population growth with growth in real property value for local governments and the growth in enrollments is substituted for population growth in school districts. This is in recognition of the much greater reliance on property taxes to fund local governments in Colorado than in Oklahoma.

The first year that the Colorado TABOR revenue limits became binding was 1997, five full years after its passage. A 1991 statute limited state general fund appropriations to grow at a simple 6 percent above the previous year's level (or 5 percent of state personal income if less). At the time of the passage of TABOR, the Colorado economy was one of the fastest growing state economies in the country and its population growth was the third highest in the country. These factors made it possible for the TABOR limits to grow faster than state revenues resulting in non-binding state spending limits.

The Colorado experience shows clearly that what is really limited by a TABOR is the ability of the state government to reap the benefits of a robust economy. With Colorado's personal income growth from 1992-1998 of 46%, the fastest in the nation, state revenues increased accordingly. In 1997, the first year TABOR limits became relevant, actual state revenues grew at a rate of 8.9% while the TABOR limit was set at 6.6%. In each of the following years through 2000, the actual percentage growth in state revenues exceeded the TABOR limit by a factor from three to four times[12].

The impact on the quality of Colorado public services resulted in a coalition of state and private sector leaders, including the state Chamber of Commerce, to push for suspension of the TABOR for a period of five years. They argued that the state had become non-competitive in economic development. They cited a decline in student test scores[13], an increase in teen high school dropout rates, and a drop from eighth "most livable state in 1993 to 23rd in 2004", according to the Morgan Quitno survey, among other measures.[14] In 2005 the voters approved Referendum C which suspends the state's TABOR for a period of five years. Moreover, on November 2, 2005, Denver voters also voted to suspend their city TABOR until 2015, citing similar concerns for the ability of the city to maintain public services in the face of increasing demands associated with economic development.

In all, Colorado's eight years of a binding TABOR resulted in reduced state spending estimated to be approximately $3 billion[15] and the associated reduction in state services. It seems to be the case that Coloradoans are willing to trade tax relief benefits now for the benefits they receive from their government in terms of education, roads and other services. What it took to implement this desire was a constitutional change with its built-in lag rather than a legislative statutory change that can be accomplished with greater speed and thus is more responsive to voter desires.

## Summary and Conclusions

At the core of TABOR proposals is this difference in the reliance upon legislative action versus constitutional restraint. Oklahoma's Article X § 23 is a balanced budget requirement and is properly contained within the state constitution.

TABOR proposals to limit state government growth to a formula argue that such limits also ought to be given constitutional status because legislatures are incapable of restraint even in the face of voter desires to the contrary. Constitutional provisions ought to be ones of principle and not subject to the vagaries of circumstance.[16] As the Colorado experience shows, economic circumstances play an important role in just how much government the people desire. Other variables such as the demographics of a state, the level of economic development and the state tax structure also will play important roles.[17] Many of these are mainly outside the control of state government and thus argue for flexibility that can not be provided with a constitutional constraint.

Because the TABOR proposal rises to the level of a constitutional constraint, one must review the formula with great care. The proposed TABOR formula for state government growth places equal weight on inflation and population growth. This assumes two important facts, neither of which is accurate. The first is that the consumer price index is an appropriate measure of the cost of goods purchased by the government. The second is that population growth is an appropriate measure of the additional burden that each individual places on state government.

The consumer price index proposed by the TABOR amendment is based on the bundle of goods purchased by urban dwellers with a family of four. This index is inappropriate even for a consumer price index for families whose purchases are different from those which make up this index. The elderly do not purchase the same goods as the hypothetical urban family of four. They will have a greater component of their purchases for medical care, for example. But beyond this discrepancy between different groups of consumers is that of the state government itself. What governments purchase is vastly different from what is purchased by consumers of any family configuration or age group. While rising oil prices will affect consumers through gasoline and heating purchases, governments also will be affected through their purchases of asphalt as well. The urban family of four will be affected by increasing medical costs, but this component of their budget is radically smaller than a government's budget for the same services, given the rapidly growing demand in the Medicaid Program. The Bureau of Economic Affairs recognizes these differences and provides a State and Local Implicit Price Deflator for governments[18]. Table 2.1 provides the consumer price index for the South Region and Class B/C cities, the closest to that required by the Oklahoma TABOR proposal, and the national State and Local Implicit Price Deflator. As can be seen, in every year the cost of what government purchases has risen at a faster rate than the cost of what the urban family of four purchases. The use of a consumer price index to limit government would not simply not maintain the government's purchasing power in the face of inflation, but would result in a shrinking of government's ability to maintain services as prices rise.

**Table 2.1**

**Consumer Price Index and State and Local Implicit Price Deflator, 2000-2004 (Annual Percentage Increase)**

| Year | CPI[a] | State and Local Price Deflator[b] |
|---|---|---|
| 2000 | 2.98 | 4.33 |
| 2001 | 2.01 | 2.79 |
| 2002 | 1.08 | 2.43 |
| 2003 | 2.03 | 3.54 |
| 2004 | 2.67 | 3.29 |

[a]As published by the Bureau of Labor Statistics - South Region & Size Class B/C.
[b]As published by the Bureau of Economic Affairs.

The TABOR proposal also assumes that government growth ought to be adjusted as the population increases. Presumably, this is in recognition that the demand for government services is driven to some extent by the size of the population the government serves. Implicit in using a simple population growth metric for determining the appropriate size of a state government is the notion that all people, regardless of circumstances, are given equal weight in their call on government services. It is important to note

that state governments provide services to non-residents. States and cities that rely heavily on tourism will have a greater demand for police protection than would be indicated by the simple calculation of the resident population, for example. Perhaps more importantly, the demand for government services will change as the demographics of the resident population changes. One frequently observes this phenomenon in school districts as the school age population changes over time requiring a reconfiguration of elementary, middle, and high school resources. At the state level, a simple calculation of the population will not capture these differences in the demand for government services, either across time or across states. What this argues is that a rigid constitutional constraint that relies on a simple population metric will in time become out of line with the actual demand for government services.

It is this very tension between a rigid constitutional constraint and the flexibility of legislatively determined levels of government spending that is at the heart of TABOR proposals, in Oklahoma and elsewhere. If one believes that legislators are responsive to their constituents' desires for government services, both in terms of the scale and type of service offered, then a TABOR has no place in the constitution. If one believes that the election process can not provide the appropriate discipline to determine the proper outcome in a democratic system, then constitutional constraints are appropriate. This conundrum was articulately presented to us more than 200 years ago by James Madison in his Federalist Papers:[19]

*A republic...refine(s) and enlarge(s) the public views, by passing them through the medium of a chosen body of citizens, whose wisdom may best discern the true interest of their country, and whose patriotism and love of justice will be least likely to sacrifice it to temporary or partial considerations.*

And later:

*On the other hand...[m]en of fractious tempers, of local prejudice, or sinister designs, may, by intrigue, corruption, or other means, first obtain the suffrages, and then betray the interests of the people.*

## Endnotes

∗The author wishes to thank Mr. Zach Osko for his invaluable research assistance

[1]As quoted by the Associated Press by Mr. Rick Carpenter as he delivered the petition to the Secretary of State, December 21, 2005. The actual count will be certified and is estimated to take approximately 60 days.

[2]Oklahoma Tax Commission, OAC 701:1, particularly Chapter 1:Administrative Operations

[3]*McLoud Telephone Company v. State Board of Equalization,* (Okla..), 655 P. 2d 1037 (1982)

[4]See for example 1910 Session Laws, p. 109, Chapter 64 (House Bill 14) setting a 5 mill limit on property taxes for the support of county government, a 1 mill limit for common schools, and an additional 1 mill limit "in any county where a county high school is located."

[5]See Article X, sections 9-10B, limiting the millage levy for common schools, county government, vocational-technical schools, and other special functions of government.

[6]The maximum that an assessor can increase a property tax appraisal regardless of market forces is currently limited to five percent per year ( Article X, § 8B) and the individual personal property tax has been all but abolished. (Article X, § 8A).

[7]Article X, section 23, paragraph 1.

[8]See Article X, section 23, paragraph 1 and paragraph 4.

[9]The treatment of taxes in various gaming and cigarette compacts with Indian tribes may be considered the exception, but this measure was part of the vote on the acceptance of a state-run lottery, confounding the conclusion that the people have actually accepted a tax increase.

[10]"A Taxpayer's Bill of Rights (TABOR) for Oklahoma", Barry W. Poulson, Oklahoma Council of Public Affairs, 2004, and "The So-called 'Taxpayer's Bill of Rights' (TABOR): What it Would Mean for Oklahoma", Community Action Project and Citizens Policy Center, 2005.

[11]See for example "Revenue-Neutral Tax Reform for Oklahoma: Issues and Options", Dauffenbach, Robert C., Holmes, Alexander, Olson, Kent, Penn, David, Warner, Larkin, *State Tax Notes,* July 30, 2001, Report originally prepared for the Governor, President

Pro Temp of the State Senate, and Speaker of the Oklahoma House of Representatives

[12]"Understanding TABOR: The First Steps", The Bell Policy Center, Denver, Colorado, February, 2002.

[13]See "Do Tax and Expenditure Limits Provide a Free Lunch? Evidence on the Link Between Limits and Public Service Quality", Downes, Thomas A. and Figiio, David N. *National Tax Journal, March 1999, pg 113-28*

[14]Morgan Quinto's Most Livable State Award 2003, Morgan Quinto Press 2003

[15]Poulson, op. cit.

[16]See, for example, U. S. Supreme Court Chief Justice John Marshall's comments on what is appropriate for a constitution in *M'Culloch v. State of Maryland,* 17 U.S. (4 Wheat.) 316,407 (1819)

[17]See Kent Olson, "Oklahoma's Long-Run Budget: Unsustainable," in this volume for a discussion of the effects of demographic changes on the level and composition of government spending .

[18]See www.bea.gov/bea/dn/nipaweb/TableView.asp#Mid

[19]*The Federalist No. 10,* at 82, (J. Madison) (C. Rossiter ed. 1961)

CHAPTER 3

Kent W. Olson

# Oklahoma's Long-Run Budget: Sustainable? Affordable?

In 2008, the first members of the baby-boom generation will reach age 62 and become eligible for early retirement under Social Security. After that, the elderly population will skyrocket, putting serious strains on the Federal Government's budget because of increased expenditures for Social Security, Medicare, and Medicaid. In fact, long-run projections by the Office of Management and Budget (OMB) and the Congressional Budget Office (CBO) indicate that the federal budget is on an unsustainable path.[1] Currently, these entitlements account for 44 percent of non-interest Federal spending. Projections by the OMB indicate that by 2035, when the remaining baby boomers are in their 70s and 80s, these three programs alone could consume nearly two-thirds of the federal budget. And the problem doesn't go away when the baby-boomers are gone; it gets worse. Under a continued extension of current tax and expenditure formulas and policies, almost all of the budget would eventually go to these three programs alone.

These projections should serve as a wake up call for state governments. The aging of the population will occur in every state and exert upward pressure on entitlements such as public employee retirement benefits and Medicaid. There have been no responses to date by state governments, however, sufficient to generate the kind of long-run projections needed to examine this problem.

We perceive three reasons for this: (1) state requirements for annually balanced budgets, (2) the existence of "rainy day" funds, and (3) the expense of a long-run forecasting effort.

The need for long-run forecasting at the federal level is obvious; the federal government does not have to balance its budget annually, so a long-run gap between expenditures and revenues ultimately leads to deficits and debt that can take a serious toll on the economy.[2] State governments appear to be insulated from such a fate by balanced budget requirements. Often, however, the budget that must be balanced does not contain all of the government's revenues and expenditures. Moreover, state governments make budget decisions all the time that have unconsidered long-run consequences. Failure to consider them may simply shift the really difficult budget choices and costs of adjustment to future generations.

Many lawmakers believe that the principal long-run budgeting problem is how to provide protection against unanticipated shortfalls in revenues associated with business cycles. Their focus is on building rainy day funds that can be tapped to offset revenue shortfalls. This is a necessary endeavor, but it does not address any long-run structural imbalances in a state's budget.

Long-run forecasting is often an expensive process. Both the OMB and CBO, for example, dedicate significant resources to their long-run forecasting efforts. Fortunately, however, there is a low cost budget forecasting model that has many of the properties needed to forecast the effects of population aging and current tax and expenditure formulas and policies on state budgets. This model, developed by Bruce Baker of the U.S. Department of Commerce, Daniel Besendorfer of Boston University and Universitat Freiberg, and Laurence Kotlikoff of Boston University and the National Bureau of Economic Research (hereafter referred to as BBK), is available for download on request.[3]

We have used this model to examine long-run prospects for Oklahoma's state government budget. What we have found is that the state's budget, like that of the federal government, is on an unsustainable path. Oklahoma state expenditures are currently designed to eventually grow much faster than state revenues, resulting in a

significant fiscal gap. Like the federal budget, much of this gap stems from exploding health care entitlements, especially for Medicaid, and underfunded retirement programs, especially Oklahoma Teachers' Retirement. State revenues fail to keep pace with expenditures primarily because of relatively slow rates of growth of the general sales tax and the severance tax.

Our projections indicate that the state's fiscal gap (present value of expenditures in excess of the present value of receipts) in 2006 is over $616 billion. And this may be an understatement; it doesn't account for the high cost of waiting to fix it, unfunded state public employee retirement obligations, and a large fiscal gap in the Federal Government's budget.

The state's fiscal gap can be eliminated by reducing the annual rate of growth of spending or increasing the annual rate of growth in taxes. If the former course were chosen, which seems likely, a cap on annual spending growth would have to be invoked. The annual rate of growth consistent with eliminating the fiscal gap is far greater than the annual rate of growth that would be invoked under a Colorado-type TABOR, however. The latter would shrink government spending as a percentage of real personal income far below its current level. Eliminating the fiscal gap, however, would allow government spending as a percentage of real personal income to grow well beyond its current level. Assuming that the current ratio of government spending to real personal income is about right, this suggests a spending cap related to the growth of real personal income, unlike a TABOR cap that would limit real spending growth to the rate of growth in the total population. Given the rates of growth inherent in an uncapped environment, the imposition of any spending cap is going to require some difficult budget choices. Hopefully, they will be made only after careful consideration of the costs saved relative to the benefits given up.

## Basic Requirements of Long-Run State Budgeting

The first requirement of long-run state budgeting is that the budget to be forecast should include all of the government's revenues, expenditures, and obligations. For Oklahoma, this means that the appropriate budget is much larger than the General Revenue Fund that is the basis for annual appropriations by the state legislature. It should also include revenues from fees and charges, intergovernmental receipts and expenditures, public retirement funds, the unemployment insurance fund, and general obligation debt.

The second requirement is that a long-run budget forecast should be based on projected changes in population. Population changes are not only the key to the number of taxpayers and clients for state services, but they can be forecast with relatively good precision. The forecast must incorporate both general population growth and changes in the relative size of specific cohorts, however. The latter is especially important in the context of an aging population.

The third requirement is that the projection of the budget should be based on current laws, regulations, and policies. It should incorporate projected revenues and expenditures that reflect the continuation of what the CBO calls "current law" in order to determine whether the budget based on current law is sustainable.

The fourth requirement is that the long-run should be very long. The ideal measure would be a forecast of the budget in perpetuity. We are not able to do that with the model at hand, but we can make projections for as long as 75 years, enough to clearly reveal the dimensions of the state's long-run fiscal future.

The fourth requirement is that all future values must be discounted or calculated as present value equivalents. This is necessary to allow for the fact that a dollar received or paid at a future date is less valuable or costly than a dollar received or paid today.

## Oklahoma's Global Budget

Table 1.1 contains the principal budget items that can be forecasted with the BBK model. Data for these categories come from the U.S. Census Bureaus' State Government Finances. The scope of this budget meets the first budget forecasting requirement; namely, that the budget to be forecast should include all of the government's revenues, expenditures, and obligations. To distinguish it

from other possible budgets, we label this the Global Budget. Within the table, net general expenditures are expenditures for each item minus fees and charges for that item. There a number of offsets such as this, the most important of which are the fees and charges that offset a significant share of higher education expenditures.

## Oklahoma's Aging Population: Effects on Revenues, Grants, and Expenditures

BBK's population projections for Oklahoma are based on U.S. population projections by age and sex reported by the Social Security Administration in the 2001 Trustees Report.[4] Population counts for Oklahoma are determined by multiplying the U.S. population counts by Oklahoma's age- and sex-specific shares. The latter are based on a 1995 Census projection of age- and sex-specific populations for Oklahoma through 2025.

Oklahoma is among the states whose population is projected to grow relatively slowly, only 0.44 percent per year on average. Even at this slow rate of growth the total population will increase by 39 percent over the next 75 years, from about 3.6 million to 5 million.

**Table 1.1**

**Oklahoma Global Budget**

| Receipts | Expenditures |
|---|---|
| ***Taxes*** | ***Net General Expenditures*** |
| Individual Income Tax | Executive and Legislative |
| General Sales Tax | Tax Collection and Financial |
| Motor Vehicle Licenses | Prisons |
| Motor Fuels Taxes | Agriculture |
| Other Sales Taxes (includes Severance Tax) | Energy |
| Corporate Income Tax | Natural Resources |
| Insurance Premium Tax | Transportation |
| Tobacco Taxes | Water |
| Estate and Gift Taxes | Sewer |
| Alcoholic Beverage Taxes | Sanitation |
| Other Taxes | Education |
| ***Non-Taxes*** | Elementary and Secondary |
| Fines and Forfeits | Higher Education |
| Donations | Other Education |
| Rents and Royalties | Health |
| Other Non-Taxes | Hospitals |
| ***Contributions for Social Insurance*** | Medicaid |
| ***Net Intergovernmental Transfers*** | Recreation |
| Medicaid and other Welfare Grants | Disability |
| Transportation Grants | Welfare |
| Education (primarily state support of local schools) | Other General Expenditures |
| Health and Hospital Grants | |
| Other Intergovernmental Net Transfers | |
| ***Retirement*** | ***Retirement*** |
| Non-Interest Receipts | Retirement Benefits |
| Interest Income | |
| ***Unemployment Insurance*** | ***Unemployment Insurance*** |
| Non-Interest Receipts | Unemployment Insurance Benefits |
| Interest Income | |
| | ***Debt*** |
| | Long Term Full Faith and Credit Debt |
| | Long Term Non-Guaranteed Debt |
| | Short Term Debt |

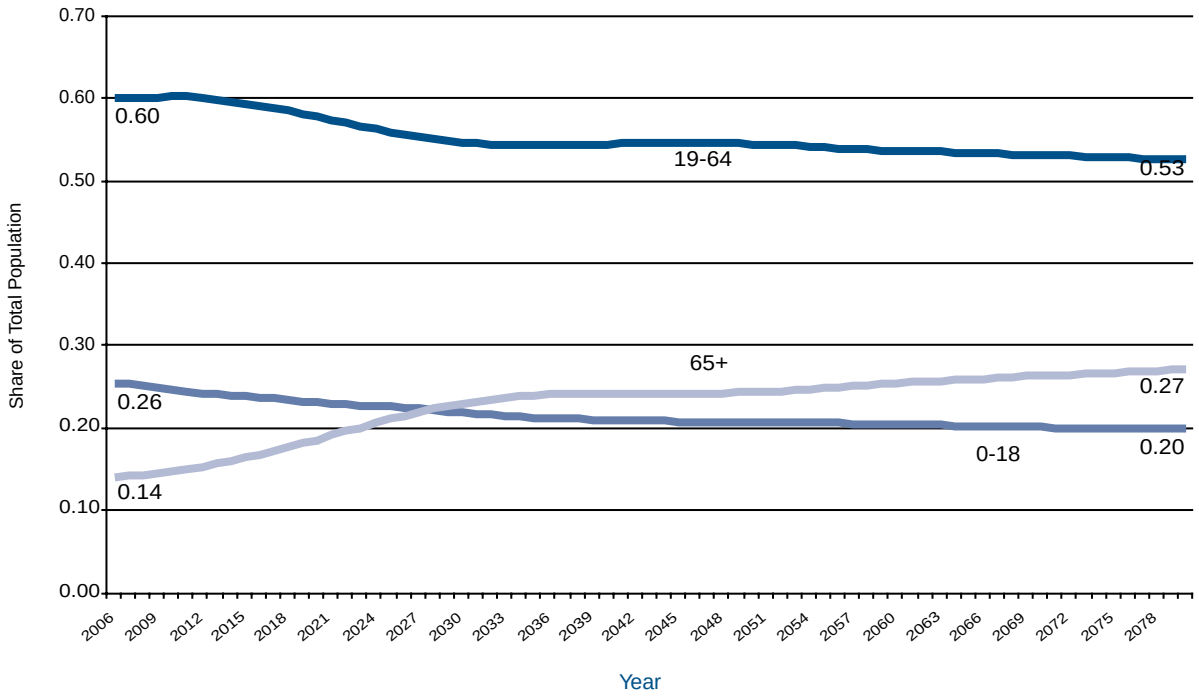
The population of people age 65 and older is projected to grow much faster – about 0.9 percent per year. At this rate of growth, the share of the total population 65 and older will increase from its current level of 14 percent to 27 percent over the course of the 75 year projection period. This trend is illustrated in Figure 3.1 by the line labeled 65+. While this is happening, the share of the population 19-64 – the core of the working age population – is projected to fall from 60 percent to 53 percent (see the line labeled 19-64 in Figure 3.1). Unless there is a dramatic increase in the percentage of the 65+ age group who will be working beyond age 65 the number of workers per retiree will be cut by more than half, from 4.3 to 1.95.

What these trends imply is that government programs serving the elderly, such as Medicaid and public employee retirement, will grow relative to programs serving other age cohorts, such as education. This much appears to be commonly recognized. What is less commonly acknowledged or realized is that revenues are also going to be affected by changes in the age distribution of the population. The rate of growth of the individual income tax will fall as the share of the population in the labor force declines. The rate of growth of the general sales tax and various excise taxes may also fall as expenditure patterns change with changes in the age distribution of the population. For example, the elderly will spend a larger share of their income on services such as health care, which are largely exempt from the state's general sales tax. They may also spend a smaller share of their income on tobacco, alcoholic beverages, and transportation, slowing the rate of growth in revenues from excise taxes on tobacco, alcoholic beverages, and motor fuels.

To account for the influence of changes in the composition of the population on revenues and expenditures, BBK form age-sex profiles for the principal sources of revenues and expenditures.

**Figure 3.1**

**Oklahoma's Population, 2006-2080, Share by Age Cohort**



They use data from the Current Population Survey (CPS) to form profiles for income taxes, retirement contributions and benefits, and disability payments to state workers. Figure 3.2 illustrates the profile for the individual income tax for males, age 0-100. This is a relative profile; it indicates the revenue collected from a male at a specific age relative to the revenue collected from a male age 40.

BBK use data from the Current Expenditure Survey (CES) to form profiles for motor vehicle licenses, other licenses, the general sales tax, and various excise taxes. Figure 3.3 illustrates the profile for the general sales tax for females, age 0-100. This is also a relative profile; it indicates the revenue collected from a female at a specific age relative to the revenue collected from a male age 40.

BBK use data from the Health Care Financing Administration (HCFA – now the Centers for Medicare and Medicaid Services) to create profiles for Medicaid and other welfare expenditures. Figure 3.4 illustrates the profile for Medicaid expenditures relative to expenditures on males, age 40.

Educational expenditures are distributed according to the number of students ages 5-18 for elementary and secondary schools and number of students ages 19-22 for colleges and universities. All of the remaining revenues and expenditures are assumed to be equally distributed by age and sex. The list of revenues and expenditures not distributed by age and sex is relatively long and includes the corporate income tax, highway grants, and expenditures on prisons, highways, and hospitals. Revenues not projected by age and sex, however, account for only six percent of taxes and non-taxes in 2043 – the midpoint of the projection period. Grants not projected by age and sex account for only 15 percent of projected grants in 2043, and expenditures not projected by age and sex account for only 19 percent of projected expenditures in 2043. Thus, the projections are driven primarily by revenues, grants, and expenditures distributed by age and sex.

**Figure 3.2**

**Relative Individual Income Tax Profile**
**Males, Age 0-100**

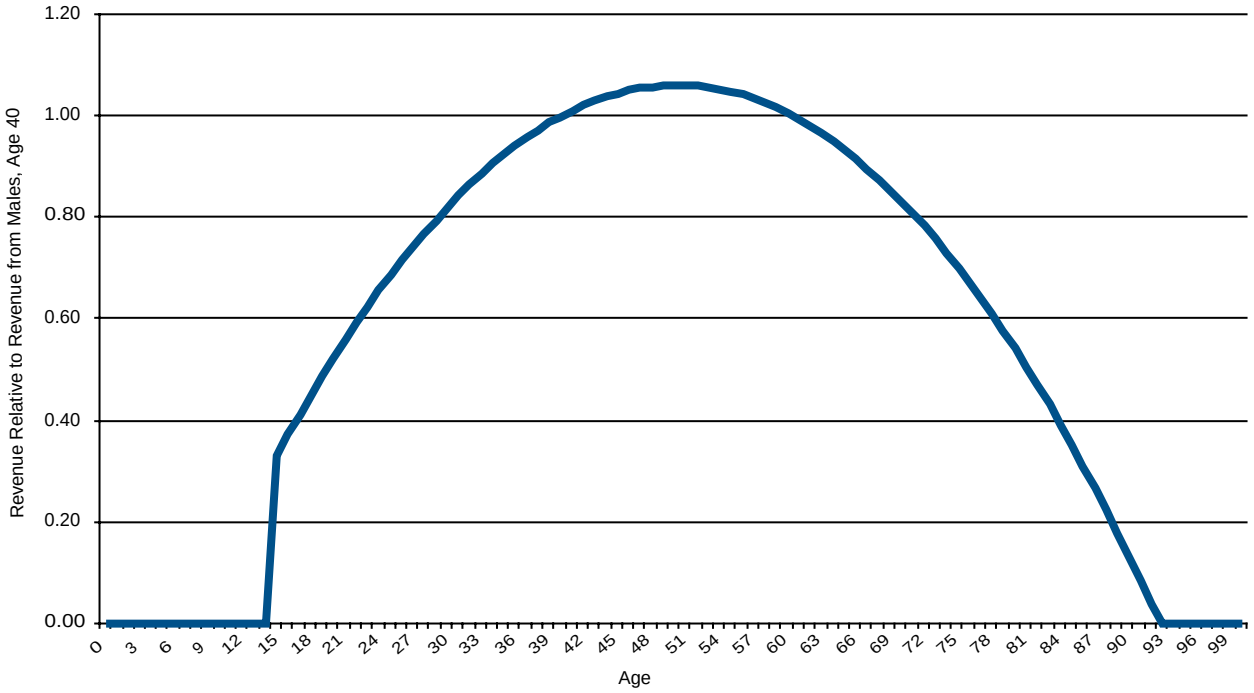


**Figure 3.3**

**Relative General Sales Tax Profile**
**Females: Age 0-100**

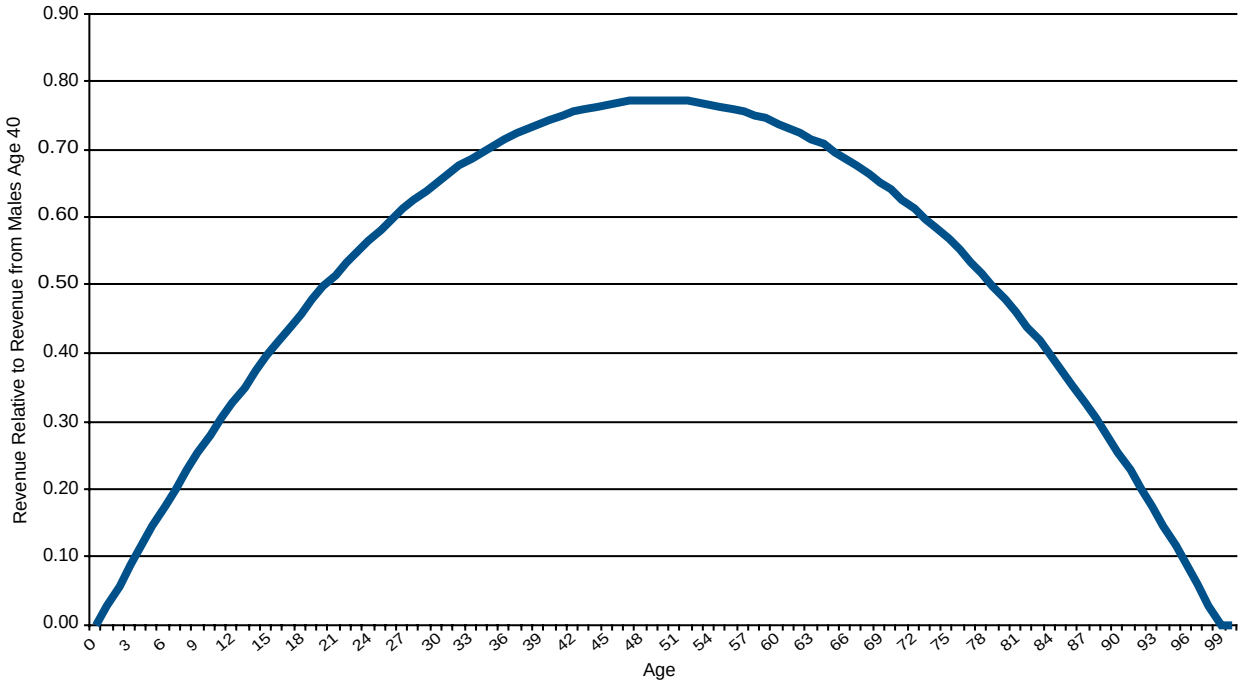
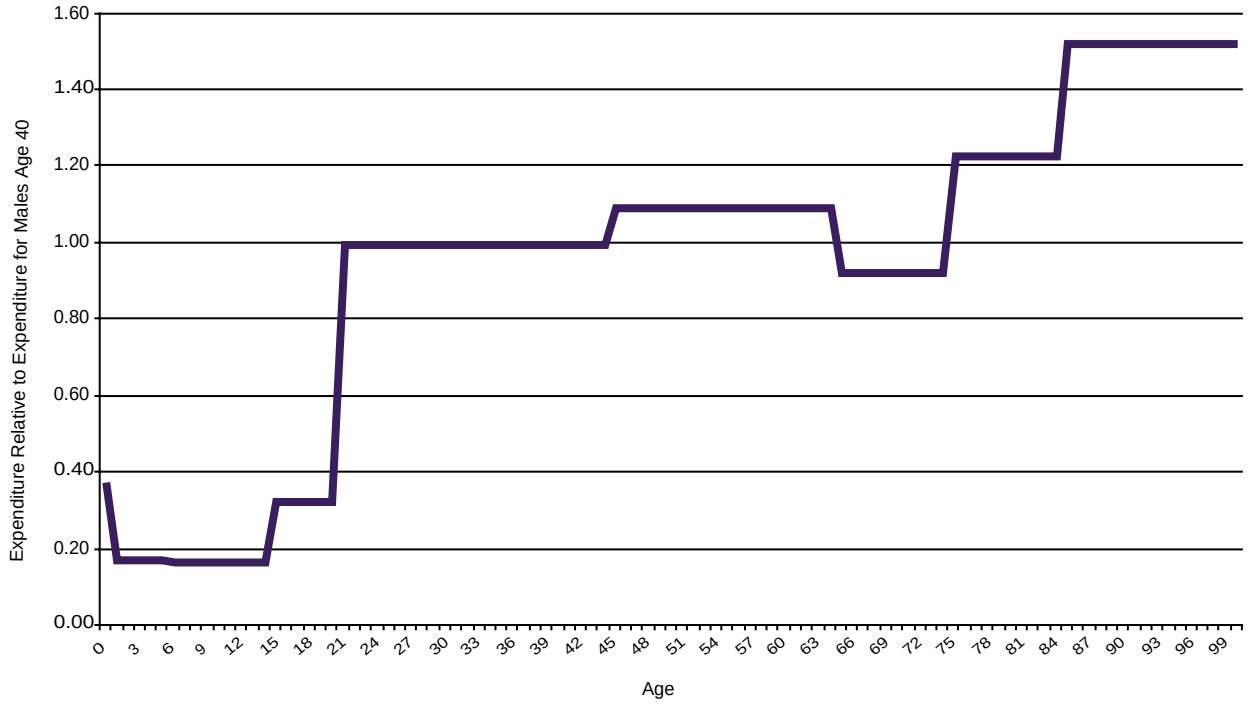



**Figure 3.4**

**Relative Medicaid Expenditure Profile**
**Males: Age 0-100**



### The BBK Forecasting Model

The BBK forecasting model can be explained with the aid of equation (1). This equation illustrates the calculation of the total expenditure, E, of type "i" in year "t"; for example, total Medicaid expenditures in 2030.

$$(1)\ E_{i,t} = \sum_{a=0}^{100} \left(e_{i,m,a,b}\ (1+g)^{t-b}\ P_{m,a,t} + e_{i,f,a,b}\ (1+g)^{t-b}\ P_{f,a,t}\right)$$

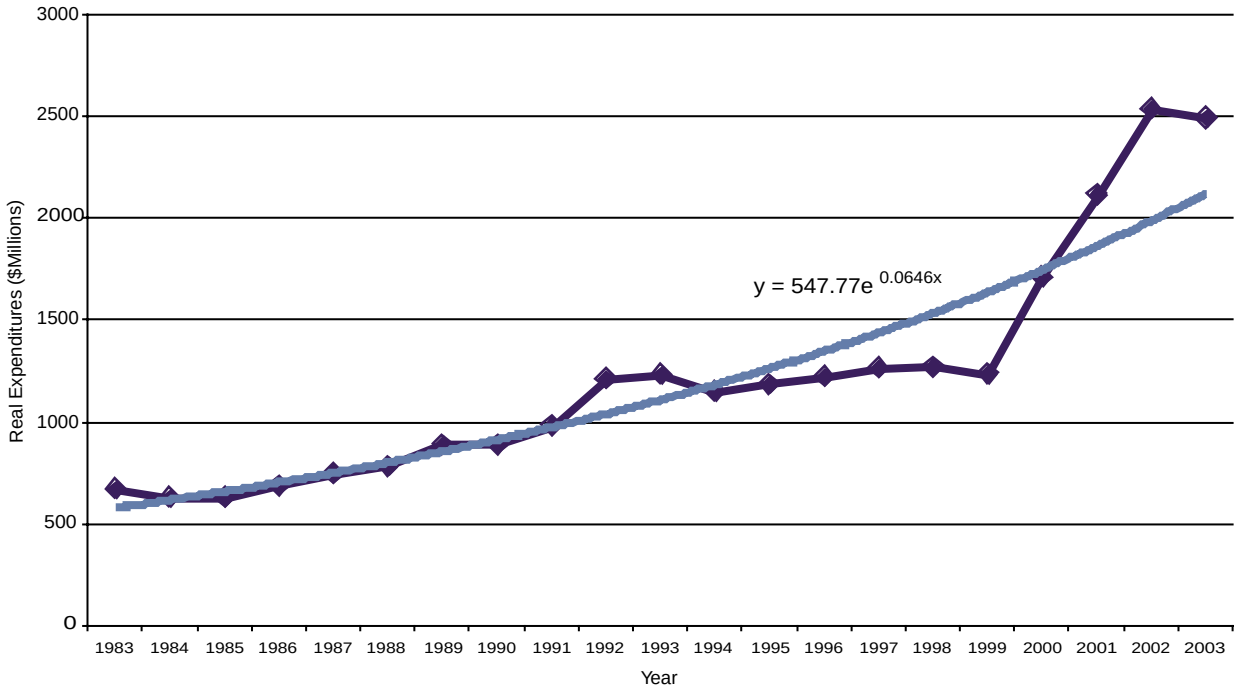
The summation sign indicates that these expenditures are to be added for all ages from 0 to 100. $e_{i,m,a,b}$ is the average expenditure, e, on program "i", for males, m, of age "a", in the base year "b" (the initial year of the forecast). This is determined using the relative expenditure profiles discussed above. $P_{m,a,t}$ is the population, P, of males, m, of age "a", in year "t". $P_{m,a,t}$ is determined using the population projections described above. The terms to the right of the + sign are the same as those to the left of the + sign except for the subscript "f", used to designate average expenditures and populations for females.

The variable "g" is the average annual rate of growth in real (inflation-free) expenditures. In our baseline forecast "g" is the exponential rate of growth determined by fitting an exponential trend line to historical data for the principal expenditures *minus* the annual rate of population growth from 1990-2000. Historical rates are the product of two factors (1) the rate real growth per capita and (2) the rate of population growth. Given that the BBK model already incorporates rates of population growth, the estimated historical rates of growth should reflect only the rate of real growth per capita. We get the latter simply by subtracting 0.7 percent (the average rate of growth in population in Oklahoma, 1990-2000) from estimated historical rates.

The determination of "g" for Medicaid expenditures is illustrated in Figure 3.5. The smooth line is the exponential curve that provides the best fit to the actual data, indicated by the irregular line. The value of the exponent in the equation in the figure is the annual rate of growth, 0.0646, or 6.46 percent. Thus, the value used for "g" for Medicaid is 5.76 (= 6.46 – 0.7). The period

**Figure 3.5**

**Real Medicaid Expenditures and Exponential Trend Line**



used to determine this value is long enough to capture the influence of both the "no growth" period from 1992 to 1999 and the resumption of rapid growth starting in 2000. Our calculated rate of growth compares favorably to the annual real rate of growth of 5.4 percent projected for the next 10 years for Medicaid by the Centers for Medicare and Medicaid Services.

Age- and sex-specific grants and revenues are projected using the same procedures. Figure 3.6 illustrates the determination of the value of "g" for the individual income tax. Here the value of the exponent is 0.0452 or 4.52 percent per year. For our baseline projection we use 3.82 percent or 4.52 – 0.7.

Table 3.2 provides a list of the estimated growth rates (after adjustment for 1990-2000 population growth) that are used in the baseline forecast.

**Table 3.2**

**Estimated Annual Real Rates of Growth**

| Budget Item | Rate |
|---|---|
| Individual income taxes | 3.82 |
| Motor vehicle licenses | 3.27 |
| General sales tax | 1.82 |
| Other Taxes and Non-Taxes | 1.08 |
| Medicaid and Welfare Grants (Primarily Medicaid) | 4.64 |
| Other Transfers | 1.12 |
| State Aid to Local Schools | 1.37 |
| Prison Expenditures | 4.70 |
| Highway Expenditures | 1.37 |
| Higher Education Expenditures | 1.71 |
| Health Expenditures | 5.30 |
| Medicaid Expenditures | 5.76 |
| Welfare Expenditures | 0.54 |
| All Other General Expenditures | 0.72 |

The reader may question whether Medicaid expends can grow faster than Medicaid and Welfare transfers because Medicaid is a federal/state matching program. Thus, one would expect them to grow at about the same rate. Actually, they do. Medicaid transfers are 0.79 of Medicaid and Welfare transfers, and Welfare transfers are 0.21 of the total. This gives a weighted average growth rate of 4.64 percent ((0.79 X 5.76) + (0.21 X 0.54)).

The only values that remained unspecified are those for "b", the base year, and the maximum value for "t", or length of the forecasting horizon. BBK use 2000 as the base year. Although it appears to be a little out of date it actually has the desirable property for a long run forecast of not being biased by the cyclical contraction of 2001-2003. Data for 2004 are not available yet, so it was not possible to choose a base year after the business cycle had pretty much run its course.

As noted, the maximum value of "t" for the BBK forecasting model is 2080. This fulfills the fourth requirement for a long-run forecast; namely, that it be very long. It falls short of the ideal forecast – one with an infinite time horizon – but it is a period long enough to reflect the difficulties that loom in Oklahoma's fiscal future.

## The Baseline Forecast

As noted, the ideal budget for forecasting purposes is the global budget; one that includes all receipts and expenditures. In a long-run context, it should include all receipts and expenditures when they occur. The BBK model includes all expenditures except interest obligations on debt, and all receipts, except interest income, for public retirement and unemployment insurance funds. To remove the biases that would be introduced by forecasting revenues and expenditures without interest obligations and interest income, the budget we forecast excludes retirement funds, the unemployment insurance fund, and general obligation debt. The omission of the retirement funds is significant enough to influence the forecast and will be addressed further below. The unemployment insurance fund and general obligation debt are so small relative to the rest of the budget that their omission is not a concern.

The first task is to forecast the baseline budget. The baseline is a forecast based on the assumption that current laws and policies will remain "as is" for the entire forecast period. Its purpose is to provide a portrait of the future as it would be without policy changes. It is not a prediction of what the future will hold, only what it would be like if no policy changes occurred. It provides a benchmark against which policy initiatives can be compared.

**Figure 3.6**

**Real Individual Income Tax Revenues and Exponential Trend Line**

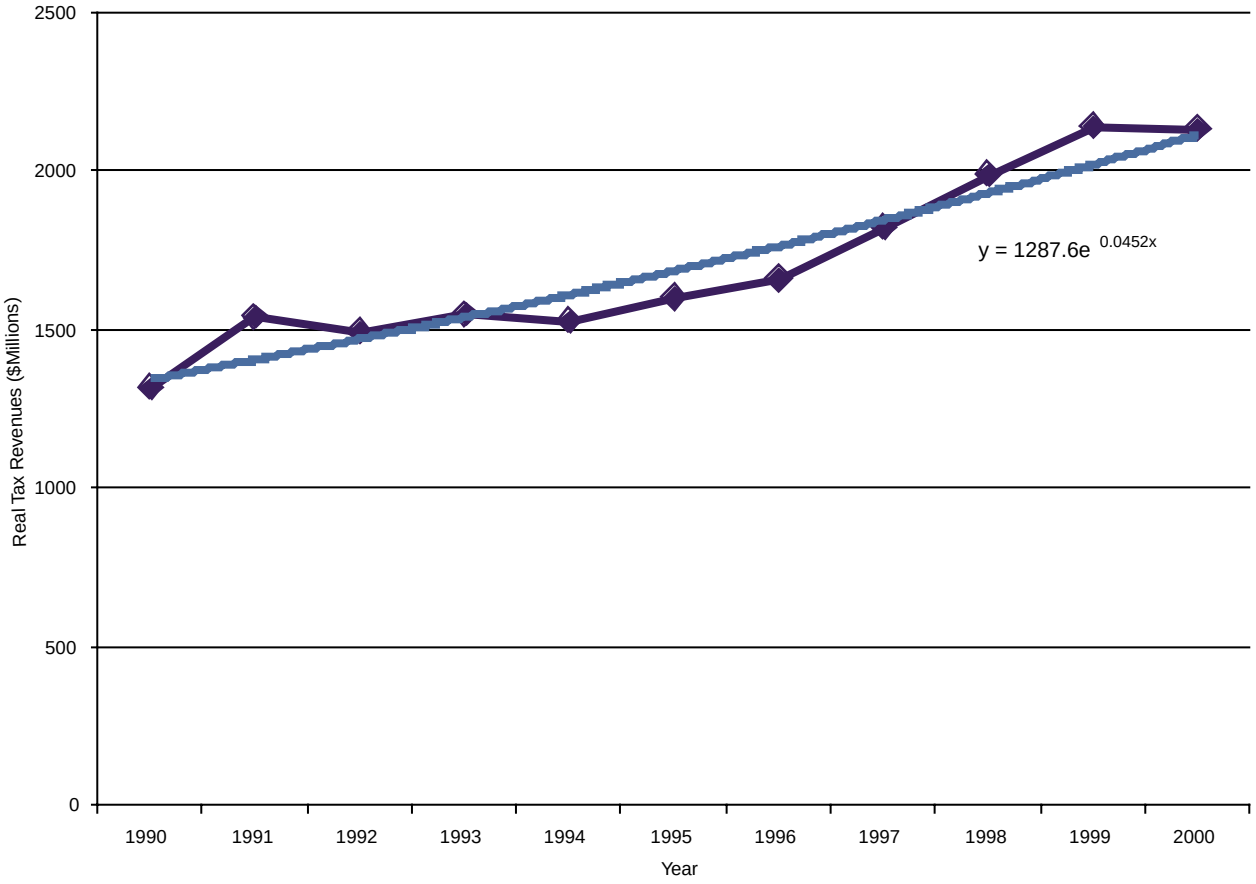
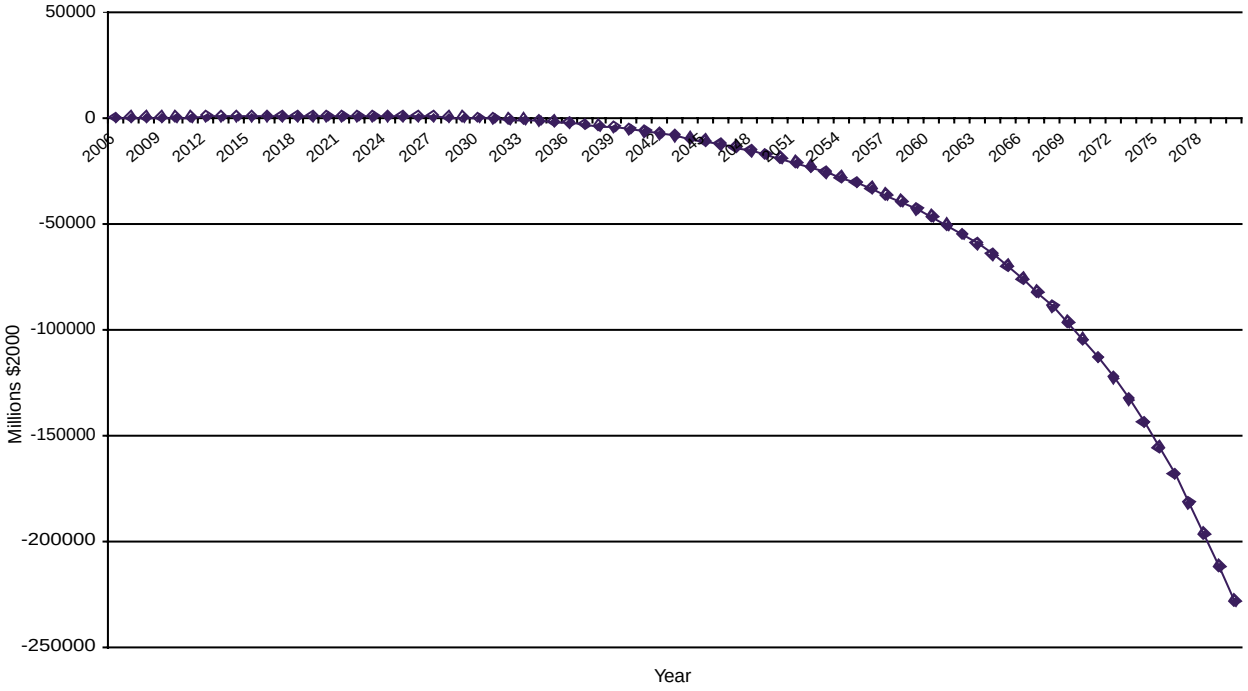



Figure 3.7 presents the results of the baseline forecast for the period, 2006-2080, in terms of the baseline budget balance. The baseline budget balance for each year is the projected receipts for that year minus the projected expenditures for that year. Observations above the horizontal line indicate a budget surplus; observations below the horizontal line indicate a budget deficit. It appears from the figure that budget would be balanced until about 2035 and then would be in deficit for the remainder of the projection period. The scale of the figure actually hides the fact that there would be a budget surplus until 2032, averaging $600 million a year, and that a projected deficit would begin in 2032. Taxes average $12,158 million per year and expenditures average $14,747, so there is an annual *deficit* in the budget without intergovernmental transfers of $2,589 million. This is more than offset by an annual *surplus* in intergovernmental transfers of $3,188 million per year. The surplus in intergovernmental transfers, however, is money that largely represents federal matching funds for Medicaid and welfare. The net result is that there would be only modest scope for new spending or tax cut initiatives. Given the state of the budget after 2031, these should be initiatives with only short-run impact or with a deficit-reducing impact after 2031.

The results of the baseline forecast can be summarized as a fiscal gap. The fiscal gap is equal to the difference between the present value of receipts and expenditures. The present value of receipts is the product of summing discounted receipts over the projection period. The present value of expenditures is the product of summing discounted expenditures over the projection period. Annual receipts and expenditures are discounted using a compounded real interest rate of 3 percent, the average rate paid on U.S. government bonds over the last 75 years.

**Figure 3.7**

**Projected Baseline Budget Balance**
**2006-2080**




The calculations reported in Table 3.3 indicate that the fiscal gap for the baseline budget in 2006 is over $616 billion. This is a measure of the additional amount that the state government would have to have on hand in 2006 to fund all future commitments for programs other than public retirement, unemployment insurance, and general obligation debt, if it could earn a 3 percent real rate of return. If it could earn more than a 3 percent real rate of return the fiscal gap would be smaller, of course.

Table 3.3 also summarizes calculations of a fiscal gap for Medicaid and welfare considered apart from the rest of the budget. This fiscal gap is the present value of federal payments for Medicaid and welfare programs minus the present value of state expenditures for Medicaid and welfare. This fiscal gap, $746 billion, is a measure of the net burden imposed on the state by these programs, primarily by future commitments to Medicaid. It shows clearly that Medicaid (and to a relatively trivial extent, welfare – not shown) commitments constitute *the* long-run funding problem. In fact, as Table 3.3 indicates, there is actually a long-run surplus in the rest of the budget of $130 billion (present value).

**Table 3.3**

**Fiscal Gap in 2006**
**Millions $2000**

| | |
|---|---|
| Present Value of Total Receipts (PVR) | $1,384,010 |
| Present Value of Total Expenditures (PVE) | $2,000,142 |
| Fiscal Gap: PVR-PVE | -$616,132 |
| Fiscal Gap: Medicaid and Welfare | -$746,375 |
| Fiscal Gap: Budget Without Medicaid and Welfare | $130,243 |
| Fiscal Gap as Percent of Total Receipts | 44.5 |
| Fiscal Gap as Percent of Total Expenditures | 30.8 |
| Fiscal Gap for Medicaid and Welfare as Percent of Total Expenditures | 37.3 |

## Other Long-Run Considerations

75-year forecasts are subject to considerable uncertainty, of course, and the future could actually turn out to be much brighter than the baseline indicates. But there are three good reasons to believe that it could get even worse than indicated by the baseline forecast.

First, it is likely that legislators will be unimpressed by a forecast for a period as long as 75 years and they will delay doing anything about it. Even if they don't commit to new tax or expenditure initiatives that would increase the fiscal gap, the fiscal gap will grow. In fact, the fiscal gap will grow every year that action is not taken to reduce it because the gap between revenues and expenditures is increasing in the last year of the forecast and it will continue to increase if the annual growth rates for revenues continue to be less than the annual growth rates for expenditures (as they are at the end of the 75-year projection period). Assuming the continuation of rates of growth in receipts of 4.69 percent and expenditures of 6.17 percent, projected for 2080, waiting to take action 10 years from now (2016) increases the fiscal gap from $616 billion to $1.5 trillion. If legislators are so short-sighted that they wait until the fiscal crisis is imminent (2030), the fiscal gap will have grown to $4.7 trillion.

The second reason why the baseline fiscal gap is likely to be an underestimate is the long-run financial status of the state's public retirement systems. Simply stated, the state's principal public retirement systems are underfunded; that is, they have long-run obligations to pay benefits that exceed projected long-run revenues. Thus, they are eventually going to be net claimants to some of the state's general revenues.

As noted, the BBK model cannot forecast the annual cash flows from the public retirement programs so they have been excluded from the baseline forecast. The annual report of the Oklahoma Teachers' Retirement System (OTRS) does have the information required to estimate cash flows, however, provided the real rate of return on trust fund investments is specified. This is fortunate because OTRS is not only the largest of the state's public retirement systems, but it is also the one that is most severely underfunded.[5]

Given data in the OTRS 2005 annual report and an assumed real rate of return of 5 percent on OTRS investments, we project the OTRS trust fund, as indicated in Figure 3.8. The balance in the fund was $16,042 million in 2004. It is projected to grow to $17,859 million in 2015. After that, it will decline relatively rapidly as trust fund balances are drawn upon to cover annual benefit payment obligations and administrative costs. The fund will become exhausted in 2035, about 6-7 years before Social Security experiences a similar fate. After 2035, OTRS receipts will be able to cover only part of annual obligations and OTRS will impose a net drain on the state budget. Addition of this scenario to the baseline would result in a larger deficit after 2035 and a larger fiscal gap.

The third reason why the baseline gap is probably understated is the likelihood that the Federal Government will reduce grants to the states as a means of solving its own budget problems. Figure 3.9 indicates the future of the federal budget deficit as projected by the President's Office of Management and Budget, expressed as a percent of GDP.[6] There is general agreement among economists that deficits of this magnitude are simply unsustainable. One partial solution to this problem would be a reduction in federal grants to the states.

There are a host of other potential solutions, of course, but we believe that the axe is quite likely to fall on federal grants for Medicaid, by far the largest of the federal payments. This is because rising health care costs are largely responsible for the growing deficit. If health care costs go unchecked, by 2075 federal health care expenditures will consume over 60 percent of all federal receipts, as illustrated in Figure 3.10. Thus, it would not be surprising if federal budget cuts fell differentially hard on health care, including federal grants to the states for Medicaid.

## What to Do?

The obvious question raised by these projections is what should be done? The menu of potential choices is very large. Here we concentrate on a few obvious approaches and draw some very general, but important lessons.

**Figure 3.8**

**Oklahoma Teachers' Retirement Trust Fund**

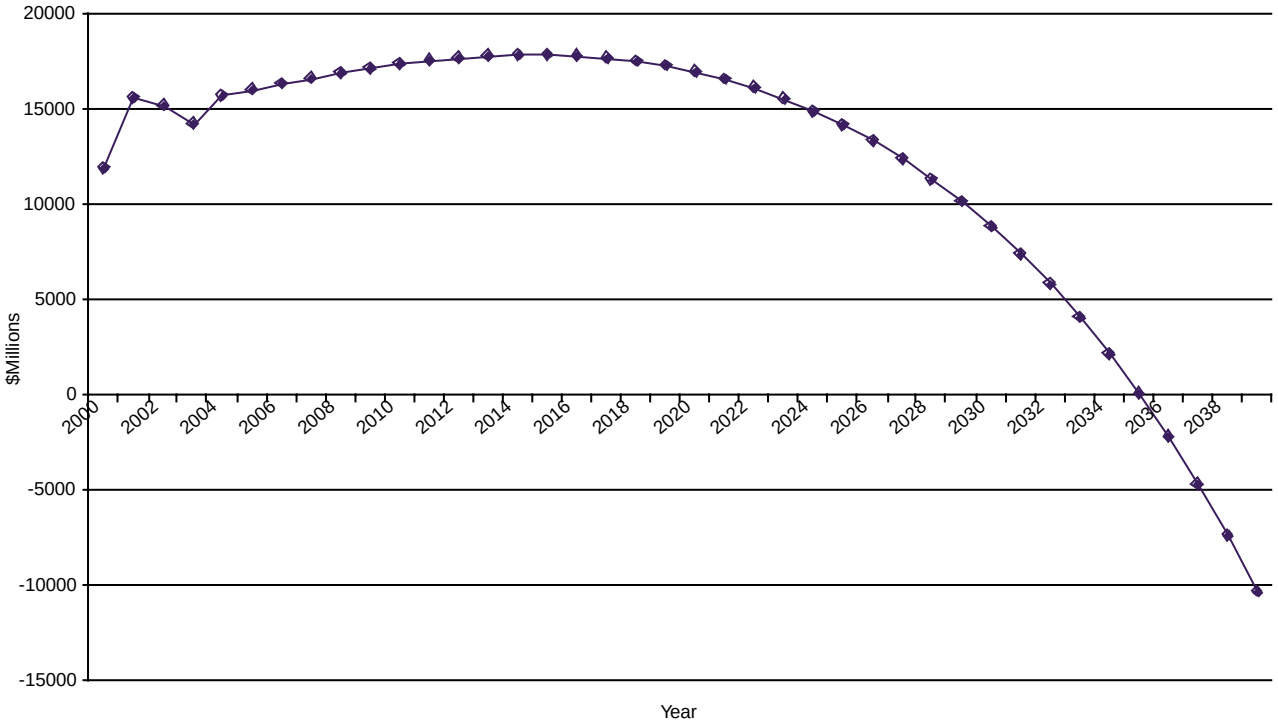



**Figure 3.9**

**Projected Federal Budget Deficit**
**2005-2075**

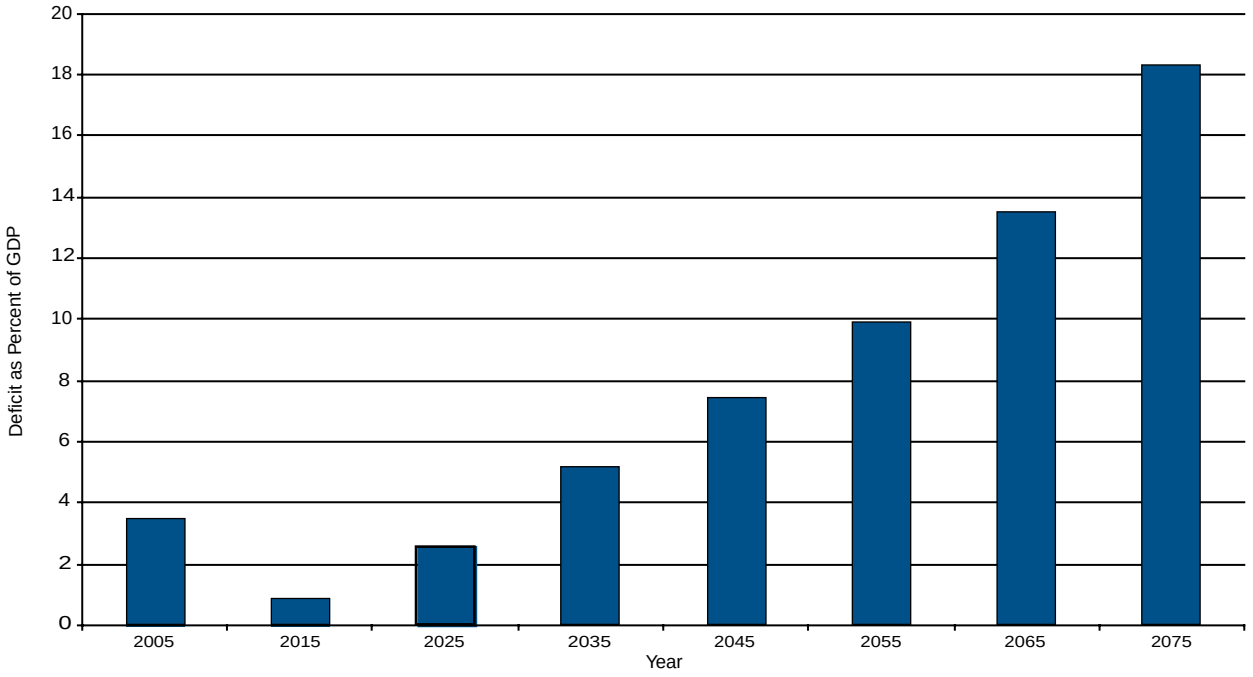
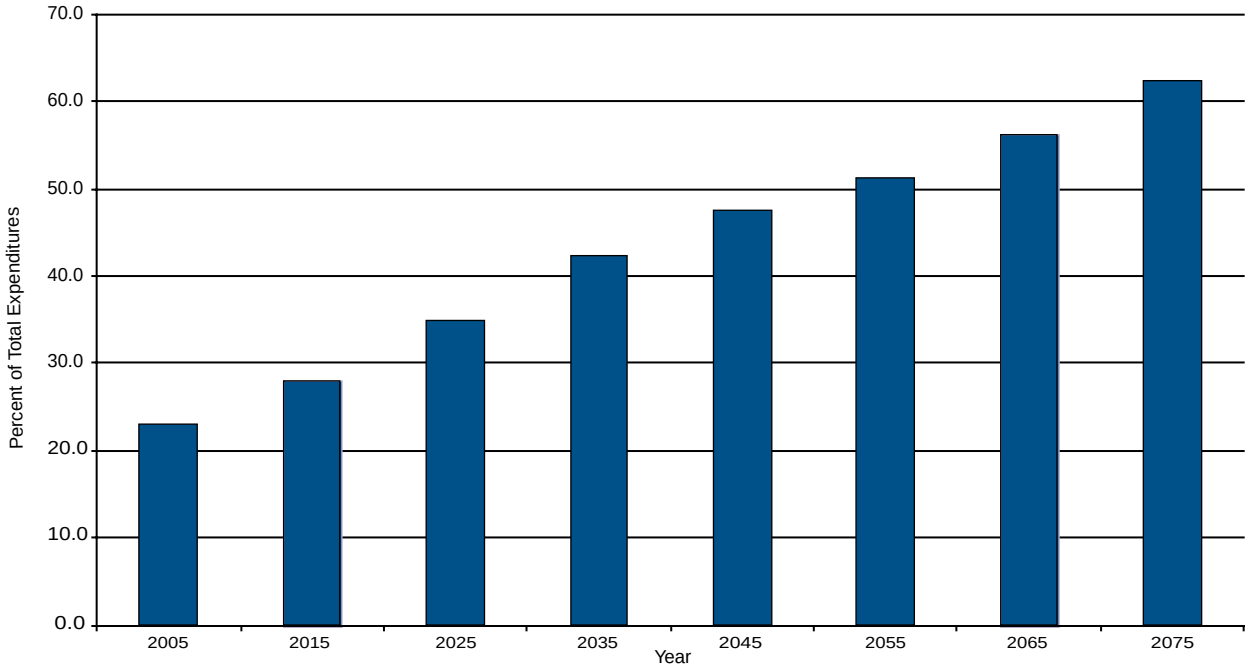


**Figure 3.10**

**Projected Federal Health Care Expenditures 2005-2075**



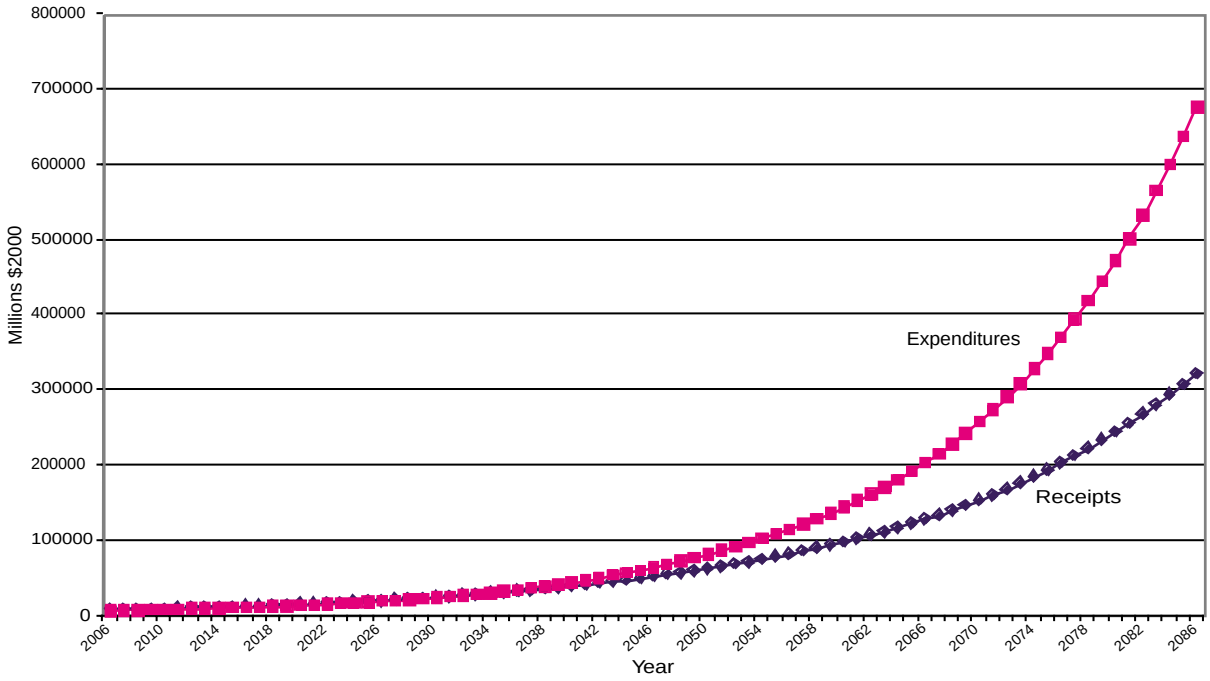

The problem is that either revenues must be increased or expenditures must be cut, or some combination of revenue increases and expenditures cuts is in order. Figure 3.11 portrays the scope of the problem. Both revenues and expenditures grow exponentially, but the annual rate of growth of expenditures exceeds the rate of growth of revenues. Thus, the task is to either reduce the rate of growth of expenditures, rotating the expenditures curve downward, or increase the rate of growth of revenues, rotating the revenue curve upward, or simultaneously reduce the rate of growth of expenditures and increase the rate of growth of revenues, rotating the two curves toward each other.

There are a large number of ways that this task could be accomplished, and the BBK model can be used to find a host of feasible solutions. Here we report only three to illustrate the magnitude of the effort required. To eliminate the fiscal gap by reducing total expenditures, alone, it would be necessary to reduce the rate of growth in total expenditures by about 25 percent, or 1.2 percentage points per year. Since real expenditures are projected to grow at 5.8 percent per year, the annual rate of growth would have to be capped at 4.6 percent. To eliminate the fiscal gap by reducing Medicaid expenditures, alone, it would be necessary to reduce the rate of growth of Medicaid expenditures by about 35 percent, or 2 percentage points per year (from 6.8 percent to 4.8 percent). The fiscal gap could be eliminated by increasing the rate of growth of both income taxes and sales taxes by 45 percent; that is, by 1.7 percentage points (from 3.82 percent to 5.52 percent) and 0.8 percentage points per year (from 1.82 to 2.64 percent), respectively.

There are a large number of ways that these changes could be achieved, but that analysis is beyond the scope of this chapter. Suffice to say that the BBK model could be used for this purpose, but it would require a lot of additional work. There is nothing to suggest that the fiscal balance could not be eliminated. Doing so would hardly be painless, however.

**Figure 3.11**

**Projected Baseline Real Receipts and Expenditures**




It is worth noting that these are indicators of the adjustments required if the indicated changes were made immediately. The longer the delay in making the required adjustments, the greater the required reduction in the expenditure growth rate and the greater the required increase in the growth rate of taxes.

This may appear to be a peculiar way to state the required reductions, but it isn't peculiar at all from the perspective of the annual budgeting process. The legislature typically makes tax and expenditure decisions based on the annual growth in revenues.

If tax increases are ruled out, then what we are talking about is a cap on the rate of growth in expenditures. This puts it in the same class as a TABOR. It is a far different cap, however, than the one commonly associated with a TABOR of the Colorado variety.

As noted elsewhere in this volume, a generic Colorado-type TABOR posits a cap on annual spending increases equal to the rate of growth of the aggregate population plus the rate of inflation. As noted, above, the BBK model can simulate the budget for annual spending to meet the needs of both a growing population and an aging population and annual increases in inflation. Since a growing *and* an aging population requires more government services than a population that is simply growing, the BBK simulation will overstate the spending that would take place with a TABOR in place. Still, a BBK simulation of the state budget under a TABOR like that currently proposed indicates a reduction in the present value of real expenditures from $2,000,142 million to $234,551 million, or a reduction of $1,765,591 million. The fiscal gap would be eliminated if the present value of real expenditures was reduced from $2,000,142 million to $1,384,010 million. So a TABOR would provide far more restraint on spending than necessary to eliminate the fiscal gap.

With a TABOR in place, real expenditures in the BBK simulation grow at an average rate of only 0.77 percent per year. If a TABOR could be simulated accurately, the annual real rate of growth would be closer to 0.44 percent per year, the forecasted annual rate of growth in the aggregate population.

If, as Holmes suggests elsewhere in this volume, the objective of a TABOR is to shrink the size of government relative to the size of the economy, it would surely achieve that objective. How much shrinkage was achieved would depend on how one measures the size of the economy. If the objective is to reduce the tax burden on individuals, the relevant measure is real personal income.

Oklahoma real personal income has been growing since 1999 at an annual rate of 2.8 percent per year. Thus, had a TABOR been in place since then, state government's share of real personal income would have already declined from 7.3 percent to 6 percent. If the annual rate of growth in personal income reverted to its long run average of around 2.2 percent and stayed at that level for the projection period of this study, a Colorado-type TABOR would reduce state government's share of real personal income to a little over 2 percent.

Eliminating the fiscal gap would not keep government spending from growing relative to real personal income. In the scenario where the fiscal gap is eliminated, real government spending grows at an average annual rate of 3.37 percent. Although the 1.17 percent per year differential relative to the growth in real personal income (3.37 – 2.2) doesn't sound like much, it results in government's share of real personal income growing from about 7.8 percent in 2006 to 17.8 percent in 2080.

We don't know what the optimum size of government is, and it's certainly a topic worthy of debate, but 17.8 percent of GSP is probably too large and 2 percent of real personal income is probably too small. Simply put, the electorate probably wants more than 2 percent of real personal income devoted to government; after all, they have been supporting more than this for a long time. It's likely, however, that the state budget makes more promises than it can keep (hence the fiscal gap), but also more than we should try to keep. We may, in fact, have to cap expenditure growth more than in scenarios that merely eliminate the fiscal gap.

Assuming that the current ratio of government spending to real personal income is about right, this suggests a spending cap related to the growth of real personal income, unlike a TABOR cap that would limit real spending growth to the rate of growth in the total population. In addition, we would need some provisions that get us through the inevitable variations in real personal income that will occur. *That* scenario is yet to be worked out, but it would be well worth the effort. Given the rates of growth inherent in an uncapped environment, the imposition of any spending cap is going to require some difficult budget choices. Hopefully, they will be made only after careful consideration of the costs saved relative to the benefits given up.

## Endnotes

[1]Congressional Budget Office, *The Long-Term Budget Outlook*, December, 2005; Office of the President, *Budget of the United States Government, Fiscal 2006, Analytical Perspectives*, p. 209.

[2]Gale, William G. and Peter Orszag, Economic Effects of Sustained Budget Deficits, *National Tax Journal*, Sep 2003; 56, 3, p. 463.

[3]Baker, Bruce, Daniel Besendorfer, and Laurence J. Kotlikoff, *Intertemporal State Budgeting.* Excel-based model available by request through Kotlikoff's website.

[4]Explanations and references can be found in a paper entitled "Intertemporal State Budgeting," available as a pdf file through Kotlikoff's website.

[5]Wilshire Research, *2004 Wilshire Report for State Retirement Systems: Funding Levels and Asset Allocation*. Can be downloaded from Wilshire Research website.

[6]Office of the President, *Budget of the United States Government, Fiscal 2006, Analytical Perspectives*, p. 209.

Larkin Warner and Robert C. Dauffenbach

# State Policy and Oklahoma High-Tech Economic Development

Since the late 1980s, Oklahoma state government has emphasized policy promoting technology-based economic development. There have been two major dimensions to this policy initiative. First, support has been provided to create, nurture, and expand technology-based business firms. Second, support has been aimed at enhancing the state's scientific and technological research and development infrastructure. After a brief introduction to new economic development policies emerging in the late 1980s, the following discussion examines (1) the extent to which the structure of Oklahoma's economy has shifted toward high-tech sectors along with how this structure compares with the nation's, (2) the greater financial support for the state's R&D infrastructure which has occurred—particularly the increased support from the federal government, and (3) how Oklahoma stacks up against other states with respect to its high-tech orientation. The discussion concludes by reviewing challenges emerging within this dimension of state economic development policy.

## State Policies for Technology Based Development After 1987

During the 1970s and early 1980s Oklahoma's economy grew at a healthy pace as it received external stimuli from favorable energy prices and, to a lesser extent, from favorable farm prices during several good years. By the spring of 1982, the state's employment picture began to weaken and within the next four years the state lost about 100,000 non-farm payroll jobs. Economic development rapidly became a major policy concern. The result was the implementation of a major piece of legislation, the Economic Development Act of 1987.

Given the perilous condition of the state's economy in 1987, it is fair to assume that a major purpose behind the Economic Development Act was the creation of jobs—any jobs at all. However, the legislation embodied a particular vision emphasizing technology based economic development. This type of economic development warranted direct technology transfer and other assistance to technology based firms along with expanding the research and development capability of the state's research universities and related research institutions. To this end, the 1987 legislation created a new state agency, the Oklahoma Center for the Advancement of Science and Technology (OCAST) with programs of state support for basic and applied research, promotion of technology transfer, and assistance to technology based enterprise. University support by OCAST has involved grants for specific research projects, along with the initial provision of state matching funds for endowed faculty chairs created with private donations.

Another program supporting university research emerged at almost the same time as the Economic Development Act of 1987. In order to stimulate more extensive research in states with relatively underdeveloped academic research infrastructure, the National Science Foundation initiated a program in 1986 involving federal matching funds for state initiatives to support scientists. This program, referred to as EPSCoR (Experimental Program to Stimulate Competitive Research), is administered by the Oklahoma State Regents for Higher Education. EPSCoR is currently placing emphasis on building up the state's academic and industrial research capacity in nanotechnology and functional genomics (the interaction of genes).

Both OCAST and EPSCoR maintain extensive and well designed web sites reviewing their many activities (see www.ocast.state.ok.us and www.okepscor.org.)

In the late 1980s and 1990s additional measures were implemented to further enhance

technology based economic development and related academic R&D work. Two measures overcame constraints in the Oklahoma Constitution. In 1988 OCAST was given the power to develop a program of provision of seed capital to appropriate business firms (State Question 611). The seed capital program promoting technology based economic development is now administered by a private, not-for-profit contractor, i2E, which operates the Oklahoma Technology Commercialization Center. In 1998, constitutional constraints were removed on businesses using university research assets, and on faculty and university ownership in firms using university-developed technology (State Questions 680 and 691). In 1992, the domain of OCAST was expanded to include the provision of extension-type services to Oklahoma manufacturing firms (the Oklahoma Alliance for Manufacturing Excellence).

## The High-Tech Structure of Oklahoma Employment 1990-2003

As discussed above, OCAST reflected a vision of the Oklahoma economy emphasizing sophisticated technology and high quality jobs. The state's science and technology infrastructure should become relatively more important. In the private sector, high-technology enterprises should be created and/or expanded. The state's research universities should have expanded R&D capabilities and outputs. A generally favorable environment should also stimulate private sector R&D. Oklahoma should appear progressive in comparison with other states. Given these expectations, how has the overall economy performed since the Economic Development Act of 1987, the creation of OCAST, the creation of state-matching for endowed professorships, and the implementation of EPSCoR?

In this section data are examined concerning the intensity of jobs in high-technology economic sectors. The next two sections treat the extent of academic and industry R&D activity in Oklahoma and introduce compendiums of 50-state rankings using a smorgasbord of variables indicative of technology-based economic development. A widely-used approach to identifying high-technology industrial sectors was developed by economists at the U.S. Department of Labor's Bureau of Labor Statistics (BLS). This approach gives substance and boundaries to the concept of technology-based economic development. The BLS economists identified high-tech industries by examining various industries' utilization of R&D workers and workers in scientific, technical, and engineering (STE) occupations. A specific industry was classified as high-tech if its share of employment in both R&D and STE occupations was at least twice the national average proportion of hiring such workers.

Before examining Oklahoma's high-tech employment record since OCAST began, it is necessary to explain how high-tech employment data are acquired. The latest version of the BLS classification of high-tech industries was published in 1999 and used the Standard Industrial Classification (SIC) system of identifying industries.[1] In the late '90s all data reporting in the United States was shifted to a new and quite different taxonomy of industries called the North American Industrial Classification System (NAICS). Fortunately, the U.S. Department of Commerce's Office of Technology Policy has translated the BLS high-tech SIC codes into comparable high-tech NAICS codes.[2]

Virtually the only source of employment data reported at the state and national level using detailed SIC and NAICS categories permitting high-tech sector identification is found in the U.S. Census Bureau's annual *County Business Patterns* publications. These reports use the SIC system through 1997 and shift to NAICS in 1998. Tables 1 and 2 contain data on high-tech employment for the U.S. and Oklahoma for 1990 and 1997 and for 1998 and 2003 (the latest year for which data are available).

There are gaps in the data for Oklahoma in 1990 and 1997. That is because the government does not report economic information which can be used to identify the characteristics of specific firms. For 1998 and 2003, gaps in the data for Oklahoma were "papered over" by using broader, more inclusive NAICS classifications for "chemical manufacturing" (325), "other fabricated metal products manufacturing" (3329), "computer and electronic product manufacturing" (334), "transportation equipment manufacturing (except aerospace)" (336), and "other information services"

(51419). This results in a modest overstatement of the number of high-tech jobs, but has the merit of permitting a rough comparison of the overall high-tech intensiveness of the Oklahoma economy in comparison with that of the nation as a whole.

In both Tables 4.1 and 4.2, it is possible to identify Oklahoma's share of total national employment in each of the reported specific industries. Table 4.1 indicates, example, that in 1990, state employment in "petroleum refining" (SIC 291) was 1,981 or 2.694 percent of the national total in that sector of 73,527. By 1997, the state's share in this sector had dropped to 2.477 percent. However, the state's share of national petroleum refining employment was well above the state's share of total employment in all sectors, both high-tech and other, of 1.006 percent in 1990 and 1,017 percent in 1997.

**Table 4.1**

**High Technology Employment**
**Oklahoma and U.S.**
**1990 and 1997**

| SIC | Industry | OK 1990 | OK 1997 | U.S. 1990 | U.S. 1997 | OK percent of U.S. 1990 | OK percent of U.S. 1997 |
|---|---|---|---|---|---|---|---|
| 281,6 | Industrial chemicals | [a] | 745 | 230,574 | 205,918 | [a] | 0.362 |
| 282 | Plastic materials and synthetics | [a] | 118 | 130,180 | 117,099 | [a] | 0.101 |
| 283 | Drugs | 365 | 271 | 187,747 | 212,610 | 0.194 | 0.127 |
| 284 | Soaps, cleaners, and toilet goods | 279 | 263 | 126,118 | 126,105 | 0.221 | 0.209 |
| 285 | Paint and allied products | 270 | 321 | 54,678 | 52,479 | 0.494 | 0.612 |
| 287 | Agricultural chemicals | 531 | 676 | 42,507 | 38,641 | 1.249 | 1.749 |
| 289 | Miscellaneous chemical products | 389 | 395 | 87,962 | 79,683 | 0.442 | 0.496 |
| 291 | Petroleum refining | 1,981 | 1,660 | 73,527 | 67,023 | 2.694 | 2.477 |
| 348 | Ordnance and accessories | 23 | [a] | 77,567 | 39,312 | 0.030 | [a] |
| 351 | Engines and turbines | [a] | 1,295 | 88,506 | 74,108 | [a] | 1.747 |
| 353 | Construction and related machinery | 8,244 | 8,130 | 207,429 | 210,175 | 3.974 | 3.868 |
| 355 | Special industrial machinery | 1,626 | 1,695 | 177,775 | 190,152 | 0.915 | 0.891 |
| 356 | General industrial machinery | 4,806 | 5,772 | 250,878 | 262,445 | 1.916 | 2.199 |
| 357 | Computer and office equipment | 2,704 | 2,538 | 301,330 | 253,070 | 0.897 | 1.003 |
| 361 | Electric distribution equipment | 445 | 479 | 77,499 | 67,350 | 0.574 | 0.711 |
| 362 | Electrical industrial apparatus | [a] | 1,254 | 168,858 | 165,467 | [a] | 0.758 |
| 365 | Household audio and video equipment | [a] | [a] | 49,987 | 50,070 | [a] | [a] |
| 366 | Communications equipment | [a] | [a] | 249,188 | 261,858 | [a] | [a] |
| 367 | Electronic components and accessories | 1,739 | 2,649 | 547,967 | 582,192 | 0.317 | 0.455 |
| 371 | Motor vehicles and equipment | 10,375 | 9,198 | 707,160 | 815,513 | 1.467 | 1.128 |
| 372,6 | Aerospace | 6,913 | 5,231 | 825,414 | 494,913 | 0.838 | 1.057 |
| 381 | Search and navigation equipment | 657 | 670 | 317,926 | 174,850 | 0.207 | 0.383 |
| 382 | Measuring and controlling devices | 1,878 | 1,689 | 289,930 | 265,955 | 0.648 | 0.635 |
| 384 | Medical equipment, instruments | 766 | 1,000 | 229,404 | 274,374 | 0.334 | 0.364 |
| 386 | Photographic equipment and supplies | [a] | 973 | 84,425 | 64,442 | [a] | 1.510 |
| 737 | Computer and data processing services | 4,098 | 9,515 | 772,736 | 1,456,693 | 0.530 | 0.653 |
| 871 | Engineering and architectural services | 7,275 | 7,153 | 861,099 | 922,325 | 0.845 | 0.776 |
| 873 | Research, development, and testing services | 2,251 | 2,291 | 392,699 | 485,374 | 0.573 | 0.472 |
| 874 | Management and public relations services | 4,372 | 6,876 | 694,847 | 1,123,864 | 0.629 | 0.612 |
| | **High-tech subtotal** | [a] | [a] | 8,305,917 | 9,134,060 | [a] | [a] |
| | **Total, all industries** | 940,800 | 1,127,734 | 93,476,087 | 105,299,123 | 1.006 | 1.071 |

Source: U.S. Census Bureau, *County Business Patterns, 1990.*
[a]Data not disclosed.

## Table 4.2

### High Technology Employment
### Oklahoma and U.S.
### 1998 and 2003

| NAICS | Industry | OK 1998 | OK 2003 | U.S. 1998 | U.S. 2003 | OK percent of U.S. 1998 | OK percent of U.S. 2003 |
|---|---|---|---|---|---|---|---|
| 32411 | Petroleum refineries | 2,544 | 1,798 | 69,491 | 59,590 | 3.661 | 3.017 |
| 325 | Chemical manufacturing | 3,835 | 3,159 | 900,706 | 841,375 | 0.426 | 0.375 |
| 3329 | Other fabricated metal products manufacturing | 6,187 | 5,675 | 333,358 | 274,749 | 1.856 | 2.066 |
| 3331 | Agriculture, construction, and mining machinery manufacturing | 7,979 | 6,941 | 220,938 | 172,356 | 3.611 | 4.027 |
| 3332 | Industrial machinery manufacturing | 1,760 | 1,876 | 197,896 | 144,793 | 0.889 | 1.296 |
| 3333 | Commercial and service industry machinery manufacturing | 1,323 | 1,392 | 128,572 | 103,749 | 1.029 | 1.342 |
| 3336 | Engine, turbine, and power transmission equipment manufacturing | 1,330 | 1,223 | 112,920 | 91,856 | 1.178 | 1.331 |
| 3339 | Other general purpose machinery manufacturing | 6,352 | 5,301 | 357,899 | 282,913 | 1.775 | 1.874 |
| 334 | Computer and electronic product manufacturing | 12,832 | 6,475 | 1,680,833 | 1,189,485 | 0.763 | 0.544 |
| 3353 | Electrical equipment manufacturing | 1,856 | 1,724 | 210,261 | 146,860 | 0.883 | 1.174 |
| 33599 | All other electrical equipment and component manufacturing | 354 | 236 | 57,249 | 42,435 | 0.618 | 0.556 |
| 336 | Transportation equipment manufacturing except aerospace) | 15,633 | 18,109 | 1,392,463 | 1,606,713 | 1.123 | 1.127 |
| 3364 | Aerospace product and parts manufacturing | 5,477 | 4,633 | 518,874 | 375,169 | 1.056 | 1.235 |
| 3391 | Medical equipment and supplies manufacturing | 1,367 | 1,504 | 295,914 | 305,850 | 0.462 | 0.492 |
| 5112 | Software publishers | 1,306 | 721 | 183,182 | 344,238 | 0.713 | 0.209 |
| 51419 | Other information services | 701 | 404 | 84,931 | 55,407 | 0.825 | 0.729 |
| 5142 | Data processing services | 2,699 | 3,737 | 267,524 | 403,000 | 1.009 | 0.927 |
| 5413 | Architectural, engineering, and related services | 9,580 | 14,429 | 1,171,410 | 1,235,421 | 0.818 | 1.168 |
| 5415 | Computer systems design and related services | 4,980 | 7,482 | 873,270 | 1,058,987 | 0.57 | 0.707 |
| 5416 | Management, scientific, and technical consulting services | 4,454 | 5,080 | 601,400 | 838,381 | 0.741 | 0.606 |
| 5417 | Scientific research and development services | 1,039 | 1,815 | 309,848 | 615,740 | 0.335 | 0.295 |
| 811212 | Computer and office machine repair and maintenance | 1,373 | 509 | 75,623 | 58,136 | 1.816 | 0.876 |
| | **High-tech subtotal** | 94,961 | 94,223 | 10,044,562 | 10,247,203 | 0.945 | 0.919 |
| | **Total** | 1,167,709 | 1,184,589 | 108,117,731 | 113,398,043 | 1.080 | 1.045 |

Source: *County Business Patterns, 1998* and *2003.*

This relative concentration of petroleum refining jobs suggests that this is a sector in which Oklahoma has had a comparative advantage.

For 1997, it was clear that Oklahoma had shares of industry employment well above the state's overall share of employment in six of the high-tech industries: agricultural chemicals, petroleum refining, engines and turbines, construction and related machinery, general industrial machinery, and photographic equipment and supplies.

The data in Table 4.1 permit 1990-1997 comparisons for 21 of the SIC-coded industries. For 11 of the industries, Oklahoma's share of the counterpart industry's nationwide employment increased. However, in 10 industries the Oklahoma share of nationwide employment fell. In 12 of the high-tech industries the absolute number of Oklahoma jobs expanded.

There are no gaps in the adjusted data for the 22 high-tech sectors for 1998 and 2003 in Table 4.2. In both years, Oklahoma's economy appears less high-tech intensive than the nation as a whole. Between 1998 and 2003, there was very little change in high-tech intensiveness either at the state or the national level. The state's high-tech share of state total employment was 8.1 percent in 1998 and 8.0 percent in 2003; for the nation, the shares were 9.3 percent and 9.0 percent respectively. However, total employment for Oklahoma was only 1.4 percent greater in 2003 than 1998 while the nation's employment was up 4.9 percent.

During 1998-2003, there were signs of relative strength in a number of the state's high-tech industries. The following Oklahoma high-tech industries had a higher share of employment than their national counterpart industries in 2003 than in 1998:

Other fabricated metal products manufacturing

Agriculture, construction, and mining machinery manufacturing

Industrial machinery manufacturing

Commercial and service industry machinery manufacturing

Engine, turbine, and power transmission equipment manufacturing

Other general purpose machinery manufacturing

Electrical equipment manufacturing

Transportation equipment manufacturing (except aerospace)

Aerospace product and parts manufacturing

Medical equipment and supplies manufacturing

Architectural, engineering, and related services

Computer system design and related services

Six of the above 12 industries in Oklahoma exhibited increased employment between 1998 and 2003. For the other six industries, the state increased its share of the national total even though state-level employment dropped.

The *County Business Patterns* reports include data on payroll as well as employment. The latest year for which data are available (2003) indicates that the high-tech workers in Oklahoma earned an average of $42,396 for the year—nearly 50 percent more than the statewide average reported for all employees of $28,327. The advantage of economic development emphasizing high-tech is quite clear. During the same year, the average payroll per employee in high-tech industries nationwide was $57,564 and exceeded the average nationwide payroll per employee for all workers ($35,635) by a much wider margin (62 percent greater) than is the case in Oklahoma. Perhaps Oklahoma's high-tech sector is not as *high* high-tech as the national norm. Moreover, Oklahoma has relatively few central administrative offices of nationwide high-tech corporations.

There are four conclusions evident from the examination of patterns and trends in Oklahoma high-tech jobs for the periods 1990-97 and 1998-03.

- There is no clear evidence that, in terms of employment, the structure of Oklahoma's economy has become significantly more—or significantly less—high-tech during the periods 1990-97 and 1998-03. In both periods, about equal numbers of industries gained and lost shares of their national total industry counterpart employment.

- While Oklahoma is somewhat less high-tech intensive than the nation as a whole, it not far from the national norm. For example, in 2003, 8.0 percent of the Oklahoma jobs reported in *County Business Patterns* were in high-tech industries, compared to 9.0 percent for the nation as a whole.
- Oklahoma has relatively high concentrations of high-tech employment in a few industries—indicating the likelihood of comparative advantage.
- Annual average payroll differentials leave no doubt that high-tech jobs are also high-quality jobs.

## Academic and Industry Research and Development

From the outset, a principal economic development model of OCAST involved support for academic and industry R&D and technology transfer from the research laboratory to commercial applications, along with ancillary provision of seed capital and direct technical support for improved productivity at the firm level. An important component of this model involves the use of OCAST funds to provide the basis for leverage to attract federal R&D money. Included in academic support have been programs of health research, applied research support, and Centers of Excellence. OCAST's Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs help businesses compete for federal funding. Businesses and nonprofit organizations also compete for health research and applied research funding.

OCAST's support for academic R&D was originally enhanced through the provision of matching funds for endowed professorships. The administration of this program has been transferred to the Oklahoma State Regents for Higher Education. Further stimulus for R&D has been provided by the Regents' EPSCoR initiatives.

### Academic Research and Development

The National Science Foundation publishes annual reports on academic R&D expenditures for higher education institutions.[3] Total R&D expenditures for higher education institutions for Oklahoma, the nation, and surrounding states are reported in Table 4.3 for fiscal years 1990, 1998, and 2003. There was a slight change in the

**Table 4.3**

**R&D Expenditures by Higher Education Institutions**
**Oklahoma and Surrounding States**
**1990, 1998, and 2003**
**($000)**

| | 1990[a] | 1998[a] | 1998[b] | 2003[b] | Percent change 1990-2003 |
|---|---|---|---|---|---|
| United States total | 16,057,379 | 25,341,760 | 25,854,724 | 40,077,399 | 149.6 |
| Arkansas | 48,861 | 111,173 | 116,778 | 183,183 | 274.9 |
| Colorado | 249,958 | 483,388 | 489,419 | 694,862 | 178.0 |
| Kansas | 114,651 | 211,465 | 213,096 | 310,052 | 170.4 |
| Missouri | 285,003 | 478,294 | 484,502 | 806,907 | 183.1 |
| New Mexico | 151,927 | 226,071 | 228,740 | 306,623 | 101.8 |
| Oklahoma | 130,650 | 206,627 | 208,873 | 295,098 | 125.9 |
| Texas | 1,123,835 | 1,667,654 | 1,697,344 | 2,765,634 | 146.1 |

Source: National Science Foundation, *Academic Research and Development Expenditures, FY96* and *FY03,* www.nsf.gov/statistics.

[a]Applies to doctoral degree-granting institutions.

[b]Applies to doctoral degree-granting institutions plus bachelors and masters degree-granting institutions with at least $550,000 R&D in past year.

coverage of institutions beginning in 1998 which is explained in footnotes to Table 4.3. Virtually all the R&D outlays occur in the doctoral degree-granting institutions. In Oklahoma, there are three such institutions: the University of Oklahoma including its Health Sciences Center, Oklahoma State University, and the University of Tulsa.

Between 1990 and 2003, Oklahoma's academic R&D outlays grew from $131 million to $295 million (Table 4.3). The Oklahoma increase in academic R&D during this period was 125.9 percent—somewhat less than the national rate of increase of 149.6 percent. Except for New Mexico, the surrounding states experienced more rapid growth in total academic R&D expenditures than Oklahoma between 1990 and 2003.

Between 1990 and 2003, the state's per capita academic R&D expenditures dropped from 64.2 percent to 61.0 percent of the national average (Table 4.4). Except for Arkansas, Oklahoma's per capita academic R&D expenditures were lower than surrounding states in both 1990 and 2003. In both years, Colorado and New Mexico had per capita outlays exceeding the national average, while Kansas moved from behind to ahead of the national norm.

Although the state nearly held its own in per capita academic R&D spending, at the same time it experienced a tremendous increase in the absolute amount by which it lags the nation. In 1990, the state's per capita academic R&D expenditures were $23.01 ($64.54-$42.53) behind the national norm; in 2003 that gap had more than doubled to $53.78 ($137.81-$84.03). In this sense, the state was falling behind in terms of the absolute volume of its academic R&D activity.

How successful has Oklahoma been in attracting federal funds for academic R&D activities? As pointed out in Table 4.3, Oklahoma's academic R&D expenditures grew from $130.6 million in 1990 to $295.1 million in 2003. Receipts from the federal government financed 28.3 percent of the state's academic R&D outlays in 1990, but accounted for 73.6 percent of the 1990-2003 *increase* in outlays—rising from $37.0 million to $127.1 million. In 1990, Oklahoma's federal R&D academic funds per capita were 30.9 percent of the national average; thirteen years later that ratio had risen to 42.5 percent.

**Table 4.4**

**R&D Expenditures Per Capita, Higher Education Institutions**
**Oklahoma and Surrounding States, 1990, 1998, and 2003**
**($)**

| | 1990[a] | 1998[b] | 2003[b] | Percent change 1990-2003 |
|---|---|---|---|---|
| United States total | 64.54 | 93.73 | 137.81 | 113.5 |
| Arkansas | 20.78 | 44.47 | 67.20 | 223.3 |
| Colorado | 75.88 | 118.88 | 152.68 | 101.2 |
| Kansas | 46.27 | 80.08 | 113.82 | 146.0 |
| Missouri | 55.70 | 87.74 | 141.46 | 154.0 |
| New Mexico | 100.28 | 127.57 | 163.53 | 63.1 |
| Oklahoma | 41.53 | 61.34 | 84.03 | 102.3 |
| Texas | 66.16 | 84.20 | 125.03 | 89.0 |

Source: Table 3 and U.S. Census Bureau, *Statistical Abstract of the United States, 2004-2005,* p. 20.

[a]Applies to doctoral degree-granting institutions.

[b]Applies to doctoral degree-granting institutions plus bachelors and masters degree-granting institutions with at least $550,000 R&D in past year.

Preliminary data for 2004 suggest that Oklahoma will continue to catch up with respect to obtaining federal R&D funds. The State Science and Technology Institute's January 23, 2006, issue of its'*SSTI Weekly Digest* reports that between 2000 and 2004, Oklahoma ranked 8th among the states in percentage growth of National Institutes of Health awards. During that period the state's NIH grants and contracts doubled from $44.4 million to $87.9 million. This is another reflection of the OCAST Health Research Program, the endowed chairs, EPSCoR, and the aggressive seeking of NIH funds by a closely related research institute, the Oklahoma Medical Research Foundation.

Clearly, the state was catching up in attracting federal academic R&D funds, though it remained far behind the national average and most of the states in the region. In 2003, per capita federal support for academic R&D expenditures reported for the nation

| | |
|---|---|
| United States | $85.05 |
| Arkansas | 30.19 |
| Colorado | 117.49 |
| Kansas | 57.12 |
| Missouri | 91.08 |
| New Mexico | 106.46 |
| Oklahoma | 36.18 |
| Texas | 70.15 |

In Table 4.5 there is a more complete picture of the relative sources of funding for academic R&D for the nation, for Oklahoma, and for surrounding states in 1990 and 2003. Nationwide, the shares of academic R&D financed by the federal government, state and local government, industry, institutional funds, and other sources were similar for both years. However, Oklahoma and the six surrounding states all exhibited significant increases in the share of expenditures financed by the federal government during these thirteen years, with Oklahoma's 14.8 percentage point gain the greatest of the group. Oklahoma also distinguished itself among the states in the region by having the greatest percentage point increase in the state and local government's share of academic R&D (7.9 points) and the greatest percentage point decrease in the share from institutional sources (-21.9 points).

**Industry Research and Development**

State level data in this field are also collected by the National Science Foundation. The nature of industry R&D is quite different from academic R&D. In the briefest of terms, here is how NSF divides R&D into three categories:

- *Basic research* on phenomena and facts without specific commercial application.
- *Applied research* relates to figuring out how a specific need may be met.
- *Development* involves the use of knowledge from research directed toward production of products, devices, systems or methods.

In a word, industry R&D activity is vastly more concentrated in the "D" while the academic activity is concentrated in the "R". Nationwide figures projected by NSF for 2003 indicate industry R&D spending of 4.3 percent basic, 22.2 percent applied, and 73.5 percent development. For academic institutions, the percentages are 70.4, 22.8, and 6.8, respectively. Industry itself financed 89 percent of its R&D expenditures with federal sources responsible for the rest.[4] There is no reason to expect that this national pattern of R&D allocation is much different in Oklahoma.

In Table 4.6, data on industry R&D outlays from NSF are reported for selected years 1989-2002 (the latest year published) for the nation, Oklahoma, and surrounding states. The behavior of the state numbers is rather erratic—possibly indicating the significance of the behavior of a very small number of large installations and the effects of the business cycle on firm discretionary spending on R&D. Oklahoma's industry R&D grew from $333 million in 1989 to $412 million in 2002—an increase of 24 percent. The state appears to have outperformed Missouri and New Mexico in terms of R&D growth percentage during 1989-2002, while it failed to keep up with the other surrounding states and with the nation. During that period, the state's share of total national industry R&D outlays fell from 0.33 percent to 0.23 percent—proportions far below the state's share of national population of around 1.2 percent.

## Table 4.5

### Sources of Higher Education Expenditures
### Oklahoma and Surrounding States
### 1990 and 2003

| | Federal government | State & local government | Industry | Institutional funds | All other sources | Total |
|---|---|---|---|---|---|---|
| United States | | | | | | |
| 1990 | 59.1 | 8.1 | 6.9 | 18.5 | 7.3 | 100.0 |
| 2003 | 61.7 | 6.6 | 5.4 | 19.2 | 7.1 | 100.0 |
| Arkansas | | | | | | |
| 1990 | 35.8 | 24.2 | 8.3 | 25.5 | 6.2 | 100.0 |
| 2003 | 44.9 | 30.2 | 5.2 | 14.6 | 5.0 | 100.0 |
| Colorado | | | | | | |
| 1990 | 72.0 | 4.7 | 6.4 | 9.0 | 8.0 | 100.0 |
| 2003 | 77.0 | 4.4 | 5.4 | 10.3 | 3.0 | 100.0 |
| Kansas | | | | | | |
| 1990 | 37.9 | 22.3 | 6.6 | 29.2 | 4.0 | 100.0 |
| 2003 | 50.2 | 13.6 | 2.6 | 28.2 | 5.4 | 100.0 |
| Missouri | | | | | | |
| 1990 | 53.5 | 6.5 | 9.9 | 22.2 | 8.0 | 100.0 |
| 2003 | 64.4 | 4.2 | 3.3 | 22.6 | 5.6 | 100.0 |
| New Mexico | | | | | | |
| 1990 | 56.4 | 9.7 | 14.2 | 12.8 | 6.9 | 100.0 |
| 2003 | 65.1 | 4.9 | 5.0 | 22.5 | 2.6 | 100.0 |
| Oklahoma | | | | | | |
| 1990 | 28.3 | 5.9 | 5.3 | 53.9 | 6.7 | 100.0 |
| 2003 | 43.1 | 13.8 | 5.8 | 32.0 | 5.4 | 100.0 |
| Texas | | | | | | |
| 1990 | 46.5 | 11.6 | 6.7 | 22.6 | 12.7 | 100.0 |
| 2003 | 56.1 | 12.2 | 6.3 | 15.1 | 10.3 | 100.0 |

Source: National Science Foundation, *Academic Research and Development Expenditures*, FY96 and FY03, www.nsf.gov.statistics.

## Table 4.6

### Industry R&D Expenditures
### Oklahoma andSurrounding States, Selected Years
### 1989-2002
### ($000,000)

| | 1989 | 1995 | 1999 | 2002 | Percent change 1989-2002 |
|---|---|---|---|---|---|
| United States Total | 102,055 | 132,103 | 182,711 | 182,403 | 78.7 |
| Arkansas | 51 | 181 | 326 | 225 | 341.2 |
| Colorado | 1,167 | 1,865 | 3,266 | 2,823 | 141.9 |
| Kansas | 406 | 569 | 1,448 | 1,427 | 251.5 |
| Missouri | 2,391 | 2,028 | 1,664 | 1,592 | -33.4 |
| New Mexico | 1,039 | 1,461 | 1,352 | 331 | -68.1 |
| Oklahoma | 333 | 288 | 562 | 412 | 23.7 |
| Texas | 5,051 | 6,211 | 8,661 | 10,744 | 112.7 |

Source: National Science Foundation, *Research and Development in Industry: 2001, January 2002;* NSF, *Science and Engineering State Profiles,* 2001-03, NSF 05-301, www.nsf.gov/statistics.

## State Rankings in Science and Technology

Implicit in the comparisons between Oklahoma, surrounding states, and the nation in Tables 4.3, 4.4, and 4.5 is the basic fact of interregional competition for economic development—a competition which is increasingly played out in high-technology activities. Both the National Science Foundation (NSF) and the Department of Commerce's Office of Technology Policy (OTP) have prepared reports ranking the fifty states on the basis of sets of variables assumed to reflect science and technology status. There are several other indexes comparing state performance in technology based economic development whose ratings of Oklahoma are generally consistent with the NSF and OTP studies.[5]

Although the NSF's "Science and Engineering State Profiles" reports use fewer indicator variables (17) than the OTP (38), the reports permit comparisons of rankings over a longer period of time. The NSF's web site reports Profiles data as early as 1992-94 while the OTP began issuing its reports in 2000. The NSF's general notes for its 2001-2003 report states the overall purpose of the profiles. "This series profiles state-specific data on people employed in science and engineering personnel and funding for R&D activities."

Oklahoma's ranking among the 50 states, the District of Columbia, and Puerto Rico are reported for the NSF's 17 indicator variables for 1992-1994 and 2001-2003 in Table 4.7. The indicators are listed in two groups, one of which applies to 12 specific science and engineering (S&E) performance and the other of which applies to five general state environmental indicators. Oklahoma's relative position remained rather stable during this nearly decade-long span of time.

**Table 4.7**

**Science and Engineering Indicators**
**Oklahoma Ranking**
**1992-1994 and 2001-2003[a]**

| Science and engineering (S&E) direct indicators | 1992-94 | 2001-03 |
|---|---|---|
| Doctoral scientists, 1993,2001 | 30 | 33 |
| Doctoral engineers,1993, 2001 | 26 | 30 |
| S&E doctorates awarded, 1993, 2002 | 31 | 32 |
| S&E postdoctorates in doctorate-granting institutions, 1993,2002 | 32 | 33 |
| S&E graduate students in doctorate-granting institutions, 1993, 2002 | 29 | 30 |
| Federal R&D obligations, 1993, 2002 | 38 | 40 |
| Total R&D expenditures, 1993, 2002 | 32 | 38 |
| Industry R&D expenditures, 1993, 2002 | 33 | 35 |
| Academic R&D expenditures, 1993, 2002 | 31 | 34 |
| Public higher education current-fund expenditures, 1993, 2001 | 33 | 29 |
| Number of Small Business Innovation Research (SBIR) awards, 1990-1993, 1999-2002 | 43 | 36 |
| Patents issued to state residents, 1994, 2002 | 25 | 31 |
| **General state environment indicators** | | |
| Population, 1994, 2003 | 28 | 29 |
| Civilian labor force, 1994,2003 | 30 | 29 |
| Personal income per capita, 1994, 2003 | 44 | 40 |
| Total federal expenditures, 1994, 2002 | 29 | 29 |
| Gross state product, 1992, 2001 | 29 | 29 |

Source: National Science Foundation, *Science and Engineering State Profiles*: 1992-1994 and 2001-2003, NSF 05-301, www.nsf.gov/statistics/statepro.

[a]Rankings based on 50 states, District of Columbia and Puerto Rico.

The state's ranking dropped noticeably for only five of the variables: doctoral scientists, doctoral engineers, total R&D expenditures, academic R&D expenditures, and patents. Notable gains in position were recorded for higher education expenditures and number of SBIR awards.

The NSF ranking system uses absolute values for 16 of the 17 indicators. It does not attempt to adjust for Oklahoma's population size except for the per capita personal income variable. The state's population size places it in the 28th and 29th ranks in 1994 and 2003, respectively. It is thus not surprising that the data in Table 7 show the state ranking in the high 20s or low to mid-30s for the bulk of the variables. Perhaps this procedure unfairly presents the status of states with relatively small populations. However, the procedure does have the merit of reminding the observer of the possible difficulties of states like Oklahoma achieving economies of scale or critical mass in science and technology activities.

The ranking system used by the OTP consistently avoids the problem of ranking bias due to population size. In its 2004 report, *The Dynamics of Technology-based Economic Development, State Science and Technology Indicators*, OTP researchers treat all of the 38 indicators treated as percentages, or with appropriate scale adjustment.[6] For example, instead of reporting number of engineers, it uses "engineers per 10,000 workers"; instead of ranking states by total SBIR awards, it uses "SBIR award $ per $1,000 of gross state product"; and instead of using absolute size of labor force, it uses a state's labor force participation rate (the percent of the eligible population in the labor force.) In addition to reporting a state's rank for a variable, the OTP publication also includes the absolute value of the variable and that value as a percent of the national average.

The OTP classifies the 38 variables into the five categories: Funding In-flows, Human Resources, Capital Investment and Business Assistance, Technology Intensity of Business Base, and Outcome Measures.

Since the rankings for the 38 variables are given for the 50 states, the relative position of a state can be most easily viewed within a set of quintiles, with ten ranks in each class. The number of Oklahoma variables in each quintile is as follows:

| Quintile rank | Number of variables |
|---|---|
| 1-10 | 1 |
| 11-20 | 4 |
| 21-30 | 10 |
| 31-40 | 12 |
| 42-50 | 11 |

Oklahoma's five variables in the top two quintiles are Small Business Technology Transfer (STTR) awards per $1,000 of gross state product, recent science and engineering BS degrees per 10,000 workers, IPO funds raised per $1,000 of gross state product, business incubators per 10,000 businesses, and percent of workforce employed. The remaining 33 variables are almost equally distributed across the lower three quintiles. In some instances Oklahoma's absolute value is not far from the national norm even though the state's ranking is relatively low.

Two conclusions emerge from an examination of the NSF and OTP reports. First, although there are some bright spots, Oklahoma's overall position as a science and technology based state is average-to-low. Second, the NSF report indicates that Oklahoma's relative position did not change much in nearly a decade. Both of these conclusions are consistent with the analysis of the *County Business Patterns* employment data in Tables 4.1 and 4.2 above.

## Assessment and Challenges

In spite of Oklahoma's state policy emphasis on high-tech development since the late 1980s, the state's overall economic structure has not become demonstrably more oriented toward this type of activity. At the same time, there has been a marked increase in R&D expenditures at the state's institutions of higher education, with expenditures at the University of Oklahoma, Oklahoma State University, and the University of Tulsa more than doubling from $131 million to $295 million between 1990 and 2003.

The absence of major aggregate structural response does not mean that the state's policies

have been ineffective. Obviously, the state could have lost ground since the 1980s if it had not been for policies of OCAST and other state initiatives such as EPSCoR, the endowed professorships, and State Questions 680 and 681 with their removal of constitutional constraints on state university/private business linkages.

It is also clear, at the microeconomic level, that there are numerous instances in which state-sponsored research, technical transfer, and technical assistance have assisted in the development of technology based enterprise. The growth of academic R&D infrastructure has already paid off in terns of technology-based firm start-ups. Moreover, this expansion of R&D capacity promises longer-term favorable impacts on technology-based economic development. These microeconomic impacts are summarized well in the regular publication by OCAST of *Impact Report, From Concept to Commercialization,* the latest issue of which is for 2005.

And no matter how extensive the micro-economic impact on high-tech firms, the state's allocation of funds to activities aimed at generating additional federal funds almost always involves substantial and immediate benefits exceeding state costs. A striking example of this involves the University of Oklahoma and its Health Sciences Center where in Fiscal 05 state-funded research of $19.8 million was associated with $125.9 million in externally funded research—largely involving federal funds.[7]

## A Question of Policy and High-Tech Development

Thus the question is not whether state policies for high-tech development have had favorable outcomes. Individual technology-based firms have been helped, and there have been significant increases in academic R&D spending with increased federal funding. Yet the relative overall structure of the state's economy has not become more high-tech. Thus a challenging question is whether the state has done enough.

A possible answer to this question is found in lessons from two technology-based activities already well established in Oklahoma: academic R&D and the Presbyterian Health Foundation Research Park. In both cases, policies have been relatively narrowly focused and, especially with the PHF facility, have involved the commitment of substantial resources.

**Lesson from the Promotion of Academic R&D—**The roles of OCAST, EPSCoR, and the endowed professorships in stimulating academic R&D and the acquisition of related federal funds has been discussed above. The combined resources of these three programs focused on academic R&D have had a discernable impact as their initiatives were facilitated by research administrators at the state's research universities.

- Once it was established, OCAST operated on about $7 million per year during 1991-98 and since that time has averaged annual appropriations of around $12 million. In recent years, about 60 percent of the budget has gone for the agency's health research and applied research programs. In 2006, OCAST's appropriation accounted for 0.205 percent of the state government's total appropriations.
- The EPSCoR initiative has operated with around $2 million per year in state and federal funding. The program's basic purpose is aiding faculty in seeking federal R&D funds.
- Funds for endowed professorships have primarily flowed to the research universities and have been relatively concentrated in fields in science, technology, and engineering (STE) whose faculty are engaged in R&D and frequently obtain externally funded grants and contracts.[8] The endowed positions require a state match equal to a private donation. There were 201 endowed professorships judged to be in the STE fields at the University of Oklahoma (Norman), the University of Oklahoma Health Sciences Center, and Oklahoma State University at the beginning of 2006. The total value of the endowment for these chairs and professorships was $143

million. Earnings applied to salaries and other expenses were probably in the range of $7 million per year assuming a 5 percent rate of return on the Endowment Trust Fund.[9] (This does not include endowed professorships where private money has been received, but where state matching funds have not yet become available. In December 2005 in all fields for all institutions of higher education, $71 million in private donations were awaiting the state match.[10])

The three programs together (OCAST, EPSCoR, and the endowed professorships) add around $16 million per year to higher education budgets and add significantly to personnel undertaking R&D and obtaining grants and contracts to finance their efforts.

There are instances in which the synergy between these three programs is palpable. An entrepreneurial professor obtains OCAST research funding, participates in and receives support from EPSCoR, and is awarded an endowed professorship. The outcome is a sustained program of research with a cadre of post-docs and graduate students and with a stream of federal funding. The ultimate result involves technology transfer to an Oklahoma based start-up enterprise providing relatively high paying jobs.

**Lesson from the Presbyterian Health Foundation Research Park—**This new, state-of-the art biomedical research park is located on 27 acres at the southwest corner of the Oklahoma Health Center complex in Oklahoma City. The Research Park's basic infrastructure has been funded primarily by the private Presbyterian Health Foundation (PHF), with around $70 million used for buildings and equipment. In the autumn of 2005, the park included five buildings with more than 500,000 square feet, another building under construction, and an 800-space parking garage. The park was the site for 21 high-tech companies and seven institutions and government agencies. In addition to the provision of physical facilities, the Foundation also is the source of venture capital for emerging biotech firms. It was estimated that there were nearly 1,000 jobs at the Research Park with an average range of salaries of $55,000 to 65,000 per year.[11] When the master plan for the park is completely implemented, it is anticipated that it will include a total of ten buildings and one million sq. ft. of space.

The PHF Research Park is also the location of the administration of Oklahoma state government's high-tech economic development initiatives. OCAST's offices are at the Research Park along with its subsidiary Technology Commercialization Center and i2E. Also located in the park is the Oklahoma State Regents for Higher Education with its EPSCoR and endowed professorship programs.

The lesson from the Presbyterian Health Foundation Research Park is simple: spend $70 million on targeted research infrastructure, and results follow.

**Proposal for Technology-Based Economic Development**

Reflecting the view that insufficient total state government resources have been devoted to technology based economic development, the state's current policy agenda includes a proposal for the creation of a $1 billion EDGE Endowment to establish Oklahoma as the "Research Capital of the Plains." This proposal was the lead recommendation resulting from of a major review of economic development policy undertaken in 2003-04 by a committee of citizen experts created by the Governor, the Oklahoma Department of Commerce, and the Oklahoma State Regents for Higher Education. The initiative was labeled EDGE (Economic Development Generating Excellence).[12] If the endowment were to be established, it is expected that it would generate perhaps $45 million per year to support (1)academic research infrastructure aimed at obtaining large increases in federal funding and (2)producing innovative results leading to more private businesses creating high-paying jobs. At this writing, the funding of this endowment had not been identified and remains a major challenge.

## Endnotes

[1]Daniel Hecker, "High-technology employment: a broader view," *Monthly Labor Review*, June, 1999, pp. 18-28.

[2]U.S. Department of Commerce, Office of Technology Policy, *The Dynamics of Technology-based Economic Development, State Science and Technology Indicators,* 4th edition, March 2004, www.technology.gov/reports.htm.

[3]Not included are two important Oklahoma research institutes: the Samuel Roberts Noble Foundation in Ardmore and the Oklahoma Medical Research Foundation in Oklahoma City.

[4]National Science Foundation, "U.S. R&D Projected to Have Grown Marginally in 2003," *Infobrief*, Feb. 2004, NSF 04-307.

[5]In March, 2004, the Milken Institute released the second edition of its *State Science and Technology Index.* In its overall ranking based on a set of 75 individual indicators, Oklahoma ranked 35th in 2004—and improvement from its ranking of 37th two years earlier. For a discussion of several other rating systems, see Larkin Warner and Robert Dauffenbach, "Where Does Oklahoma Rate?" in The Oklahoma Academy, *Competing in an Innovative World,* 2001 Town Hall Research Report, 2001, pp. 29-52.

[6]U.S. Department of Commerce, Office of Technology Policy, 2004.

[7]Oklahoma State Regents for Higher Education, Educational and General Budgets, Summary and Analysis, Fiscal Year 2006.

[8]What is referred to herein as "endowed professorships" actually includes positions labeled endowed "chairs, professorships, lectureships, and positions for artists-in-residence."

[9]The 2005 distribution for the total endowment was based on a 3-year average of 4.5 percent.

[10]John Greiner, "Supreme Court clears higher education bonds," *The Oklahoman*, Dec. 14, 2005. A $50 million bond issue has been approved by the Oklahoma Supreme Court to provide the bulk of the needed state matching money to activate the additional endowed professorships. However, opponents continue to object. John Greiner, "Rehearing sought on endowed chairs' funding," *The Oklahoman*., Dec. 29, 2005.

[11]Tricia Pemberton, "Walgreens to bring 125 jobs to the city," *The Oklahoman,* Aug. 31, 2005.

[12]For a current review of the status of the EDGE program, see Oklahoma State Regents for Higher Education, *Oklahoma's EDGE, 2006 Progress Report*. www.okhighered.org.

Ronald L. Moomaw

# Education Reform in Oklahoma: A State at Risk?

In April, 1983, in "An Open Letter to the American People," the National Commission on Excellence in Education transmitted its report, *A Nation At Risk: The Imperative For Educational Reform*, to the U.S. Secretary of Education. This influential report has led to many changes in the American educational system, but these changes have not eliminated reform from the educational policy debate. American educational achievement still lags behind that of many other countries and it has not improved significantly over time. Oklahoma performance lags behind the American average and it too has not improved significantly over time. In this study, we first discuss some evidence supporting the above claims. Then we consider whether the lagging performance is caused by lack of funding or organizational structure. The funding of education in terms of spending per student is among the lowest of any state. A policy of substantially increasing expenditures per student, a "Stay the Course" policy, is one alternative to be considered, if Oklahomans want improved educational outcomes. Other policies that attempt to improve outcomes, without increasing spending dramatically, include accountability and choice. The No Child Left Behind legislation emphasizes accountability with some elements of choice as a last resort—this might be called "Improve or Else." Expanded choice as a policy also has supporters; it is a policy perhaps best described by the phrase "The Customer Is Always Right".

## Educational Performance in Oklahoma and in the United States: Selected Comparisons

This section reviews some of the evidence about educational performance in the United States. It follows this review with a discussion of educational performance in Oklahoma.

### U.S. Educational Performance

Evidence for lagging U.S. public school performance comes from international comparisons of the math and science achievement of high school seniors. According to the U.S. Department of Education, the Third International Mathematics and Science Study (TIMSS) ". . . is a fair and accurate comparison of mathematics and science achievement in the participating nations. The students who participated in TIMSS were scientifically selected to accurately represent students in their respective nations." In particular, "Because the high enrollment rates for secondary education in the United States are typical of other TIMSS countries, our general population is not being compared to more select groups in other countries." The study concludes that in 1995, "The performance of U.S. students in mathematics and science at the end of secondary school is among the lowest of those countries participating in TIMSS. This is true for all students as well as for students in advanced mathematics and physics."[1]

Repetition of these studies of math and science achievement across countries in 2003 for fourth and eighth graders found that fourth graders in the United States showed no improvement over 1995, although fourth graders in 14 other countries showed improvement... U.S. eighth-graders, however had better math and science performances in the latter year, and U.S. students gained on students in most other countries tested.[2]

U.S. students in earlier grades do better in these comparisons, but later they fall behind. An Organisation for Economic Co-operation and Development (OECD) study of math and science achievement by high school graduates shows lagging U.S. performance. Figure 5.1 ranks the United States and 20 other OECD countries by their math scores (test scores are measured on the

right axis) with the highest-scoring country on the left. The first bar for each country is the math score; the second, science. U.S. students' math performance was below that of 17 of the 20 other countries. U.S. performance in science was a little, but not much, better. The line in Figure 5.1 shows that cumulative spending on a student's 12 years of education (measured on the left axis) has little to do with achievement. The United States, for instance, spends more per pupil than any other country in the figure except Switzerland, but, as we have seen, U.S. scores are lower.[3]

## Oklahoma Educational Performance

In Table 5.1 we present average composite ACT scores for the 25 states in which more than 50 percent of the graduating seniors take the ACT examination (the college entrance exam most commonly used in Oklahoma and other Midwestern states).[4] The states are ranked according to their 2005 scores, with Colorado and Illinois removed from the ranking. (These states went to 100 percent participation sometime after 1994, and this big increase in participation quite naturally reduced the composite score because graduates who were not planning to go to college took the exams.) Fifteen (if we include Tennessee because of its slightly higher score and much greater participation rate) of the 23 states considered ranked ahead of Oklahoma in 2005. Arguably, only Alabama, Louisiana, Mississippi, and New Mexico ranked behind Oklahoma, and these states, except for New Mexico, had larger increases in, and higher rates of participation than Oklahoma. Notably, Arkansas, Kentucky, Tennessee, and West Virginia were behind Oklahoma in 1994 and had essentially overtaken it by 2005. In addition, 16 states gained on Oklahoma because they had bigger absolute increases in test scores.

**Figure 5.1**

**Science and Math Scores for OECD Countries Compared with Per Pupil Spending**

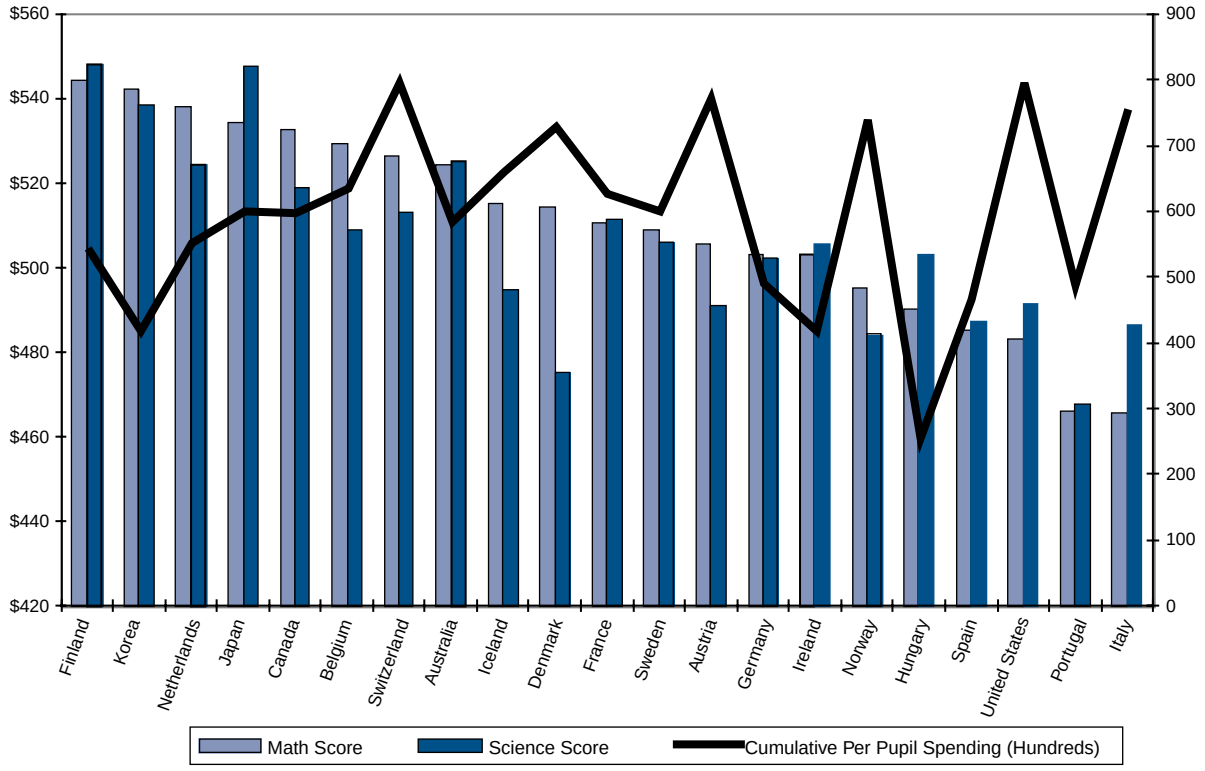


**Table 5.1**

**Average ACT Scores, States with More Than 50 Percent Participation**
**1994 and 2005**

| State | Percent Graduates Tested 1994 | Percent Graduates Tested 2005 | Average Composite Score 1994 | Average Composite Score 2005 | Absolute Change 1994-2005 | Percentage Change 1994-2005 |
|---|---|---|---|---|---|---|
| Minnesota | 60 | 68 | 21.8 | 22.3 | 0.5 | 2.3 |
| Wisconsin | 64 | 69 | 21.9 | 22.2 | 0.3 | 1.4 |
| Iowa | 64 | 66 | 21.9 | 22 | 0.1 | 0.5 |
| Nebraska | 75 | 76 | 21.3 | 21.8 | 0.5 | 2.3 |
| Montana | 57 | 57 | 21.8 | 21.8 | 0.0 | 0.0 |
| Kansas | 71 | 76 | 21.2 | 21.7 | 0.5 | 2.4 |
| Missouri | 64 | 70 | 21.2 | 21.6 | 0.4 | 1.9 |
| Utah | 69 | 68 | 21.3 | 21.5 | 0.2 | 0.9 |
| South Dakota | 66 | 76 | 21.1 | 21.5 | 0.4 | 1.9 |
| Wyoming | 66 | 69 | 21.2 | 21.4 | 0.2 | 0.9 |
| Michigan | 63 | 69 | 21.0 | 21.4 | 0.4 | 1.9 |
| Ohio | 59 | 66 | 21.2 | 21.4 | 0.2 | 0.9 |
| North Dakota | 75 | 82 | 21.2 | 21.3 | 0.1 | 0.5 |
| Idaho | 62 | 58 | 21.2 | 21.3 | 0.1 | 0.5 |
| Tennessee | 67 | 92 | 20.2 | 20.5 | 0.3 | 1.5 |
| Oklahoma | 66 | 69 | 20.3 | 20.4 | 0.1 | 0.5 |
| Kentucky | 63 | 76 | 20.1 | 20.4 | 0.3 | 1.5 |
| West Virginia | 56 | 65 | 19.9 | 20.4 | 0.5 | 2.5 |
| Arkansas | 65 | 76 | 20.1 | 20.3 | 0.2 | 1.0 |
| Alabama | 58 | 77 | 19.9 | 20.2 | 0.3 | 1.5 |
| New Mexico | 62 | 61 | 20.0 | 20 | 0 | 0.0 |
| Louisiana | 73 | 85 | 19.4 | 19.8 | 0.4 | 2.1 |
| Mississippi | 73 | 94 | 18.7 | 18.7 | 0 | 0.0 |
| Average | 65.1 | 72.4 | 20.8 | 21.0 | 0.3 | 1.3 |
| Illinois | 67 | 100 | 21.1 | 20.3 | -0.8 | -3.8 |
| Colorado | 63 | 100 | 21.4 | 20.2 | -1.2 | -5.6 |

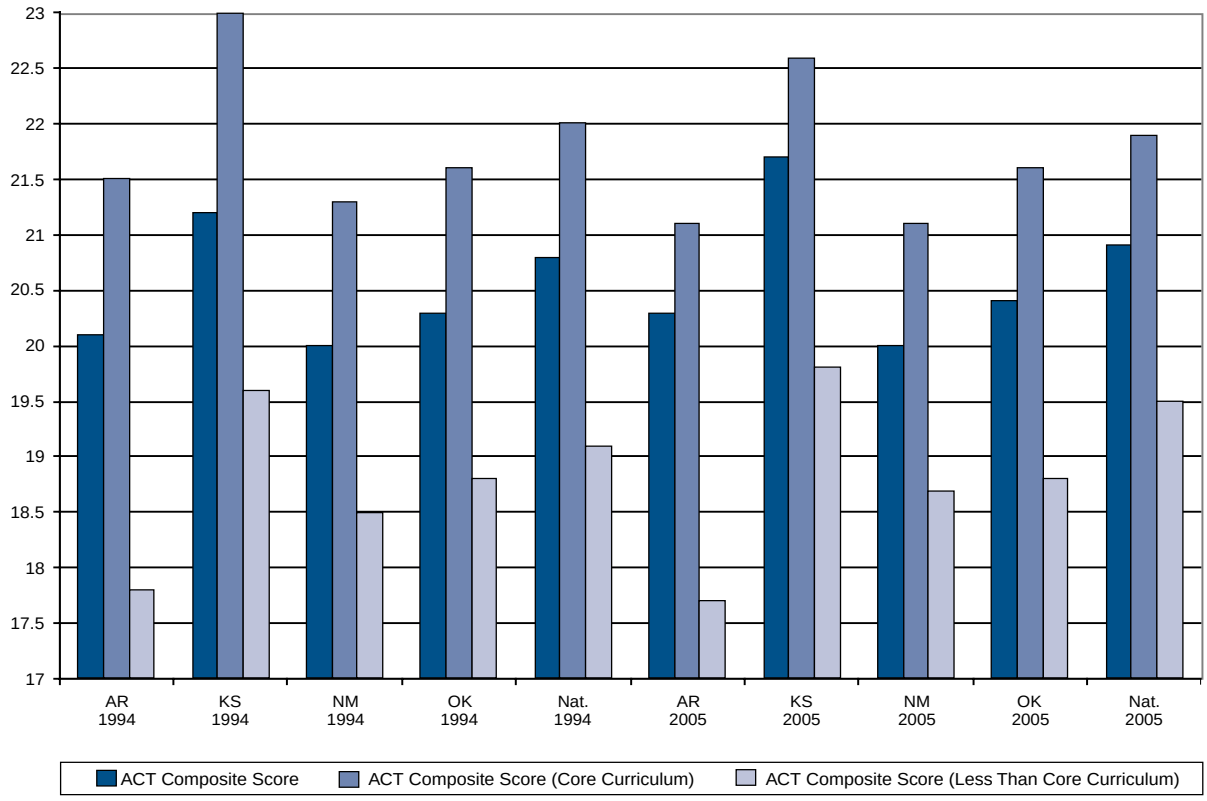
Moreover three of the four largest percentage increases were for states already at or near the top (Minnesota, Nebraska, and Kansas). The largest percentage increase was for West Virginia. The overall picture is one of Oklahoma falling farther behind the leading ACT-score states and being overtaken by most of the few states that have lower scores.

Comparisons with other states and the nation show that Oklahoma lags the nation and many other states in ACT achievement, just as the United States lags many other comparable countries. Figure 5.2 has composite average ACT scores for Arkansas, Kansas, New Mexico, Oklahoma, and the nation, for three categories of test takers: all test takers, those who had taken the ACT core curriculum, and those who had not taken it. First compare Oklahoma with the nation in 1994. We can see that Oklahoma lags the nation in each category. In contrast, students in Kansas are uniformly above the national average.

By 2005, a substantially larger percentage of students took the exam in Arkansas, raising its participation rate from about two thirds to the Kansas participation rate of about three quarters.

**Figure 5.2**

**ACT Scores: Selected States and the Nation**




Participation in New Mexico remained stable at about three fifths with Oklahoma's rate rising slightly to more than two thirds.[5] Oklahoma's slight improvement in its overall composite score results from a relatively small increase in the proportion of test takers that had taken the core curriculum. Although Oklahoma has had significant reform and has increased resources per student, its scores are stagnant both relative to the nation and absolutely. Because of a big increase in the proportion who had taken the core curriculum, Kansas students scored substantially higher in 2005 than in 1994. The scores of students in Arkansas and New Mexico did not change much, but Arkansas's participation increased substantially, so that its flat scores suggest that average achievement is improving.

The National Assessment of Educational Progress (NAEP) scores for fourth and eight graders over about the same time period tell a similar story. In mathematics, students in Kansas outperform the national average, whereas students in the other three states are below it. Oklahoma scores have improved in both grades, coming close to the national average. Arkansas, however, has caught up with Oklahoma in recent years. The reading scores for Oklahoma have fallen whereas they have risen in Arkansas, with Arkansas scores now slightly higher for fourth graders. Oklahoma reading scores had been at or above the national scores, but have now fallen slightly below. Kansas scores again are higher than the national scores.[6] Both the NAEP and the ACT scores tell a similar story. Kansas students perform better than the national average, and Arkansas, New Mexico, and Oklahoma students do not perform as well. Arkansas students appear to be performing better and students New Mexico and Oklahoma have not experienced much change in performance.

To the extent that the "Nation at Risk" report is based on international comparisons and the lack of improvement in standardized scores, the 1983 report is still relevant. Oklahoma scores are below national scores and its trends in general are not encouraging. If the United States is a "Nation at Risk", Oklahoma qualifies as a "State at Risk". The National Education Association and the Oklahoma Education Association argue that the national and state educational problems are problems of funding. The executive and legislative branches of the federal government implied, by passing No Child Left Behind, that lack of school accountability is a major educational problem. Finally, experts outside the educational establishment— in think tanks and universities— argue that the ineffective educational system is a consequence of what is essentially a public school monopoly that denies parents choice in the selection of an educational institution for their children. We will discuss each of these, in turn, placing the discussion in the Oklahoma context where possible.

## Is More Funding the Solution?

On January 11, 2006, three Oklahoma School Districts and the Oklahoma Education Association (OEA) announced a lawsuit "alleging that the Oklahoma Legislature has failed to provide adequate or sufficient funding for common schools in Oklahoma. The Oklahoma Legislature has an obligation under the Oklahoma Constitution to establish and maintain a system of free public education wherein all of the children in the State may be educated. This lawsuit claims that the current levels of education funding are not sufficient or adequate to pay for the education standards that have been set by the State."[7] Apparently, the OEA and the School Districts involved believe that more funding is necessary to improve Oklahoma education.

We have no position on the merits of the lawsuit and we have no information regarding the allegations that insufficient funding "results in the inability of many school districts to meet state mandated class size limitations; provide every student a textbook or to provide updated textbooks and other instructional tools;..."[8] Evidence exists, however, that simply increasing spending on public schools does not lead to significantly improved performance as measured by test scores. As we saw in Figure 5.1, the performance on math and science tests across countries has little if any relation to cumulative expenditures per student.

**Resources and Educational Performance**

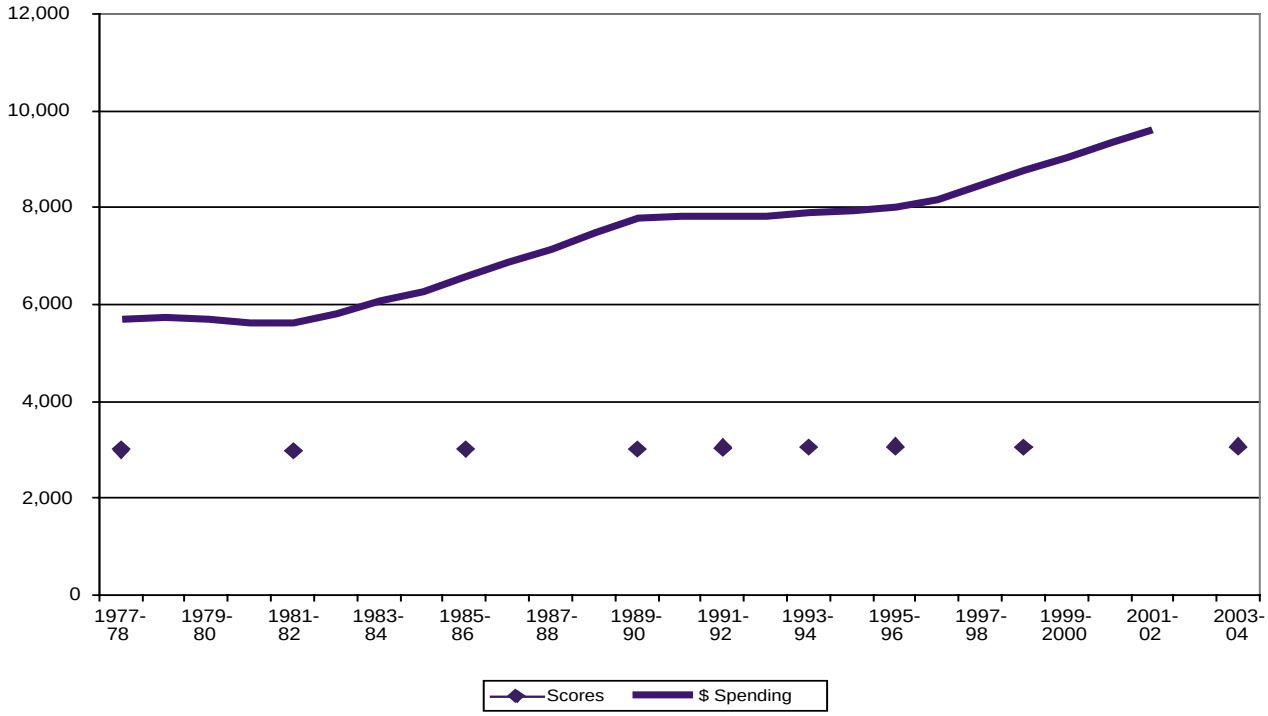
Figure 5.3 provides some additional information. Since 1977-78 inflation-adjusted expenditures per student in public schools in the United States have increased from about $6,000 to about $10,000 per pupil. This large increase in expenditures has been associated with a 2 percent increase in math achievement among 17 year olds. If we divide the achievement increase of 2 percent by the spending increase of about 66 percent, we get the achievement increase associated with a 1 percent increase in spending per student. It is 0.03. The effect of the spending increase may be positive, but it appears very small.

Based on sophisticated analysis of the relationships between educational outcomes and various resource measures, one of the leading economists who studies public education, Eric Hanushek, has concluded that "Studies of class size and pupil-teacher ratios, of teacher education, and of teacher experience, give little if any support to policies of expanding these resources... it is useful to clarify precisely what is and is not implied by the data. Perhaps the most important fact to underscore is that this finding does not imply that all schools and teachers are the same. Quite the contrary. Substantial evidence suggests that there are large differences among teachers and schools. The simple fact remains that these differences are not related to teacher salaries or to other measured resources devoted to the program."[9]

Adkins and Moomaw come to slightly different conclusions based on their study of the effect of instructional and noninstructional spending per student by school district in Oklahoma over the years 1990-91 through 1994-95.

**Figure 5.3**

**Trends in U.S. Per Pupil Expenditures and Mathematics Achievement of 17-Year Olds**



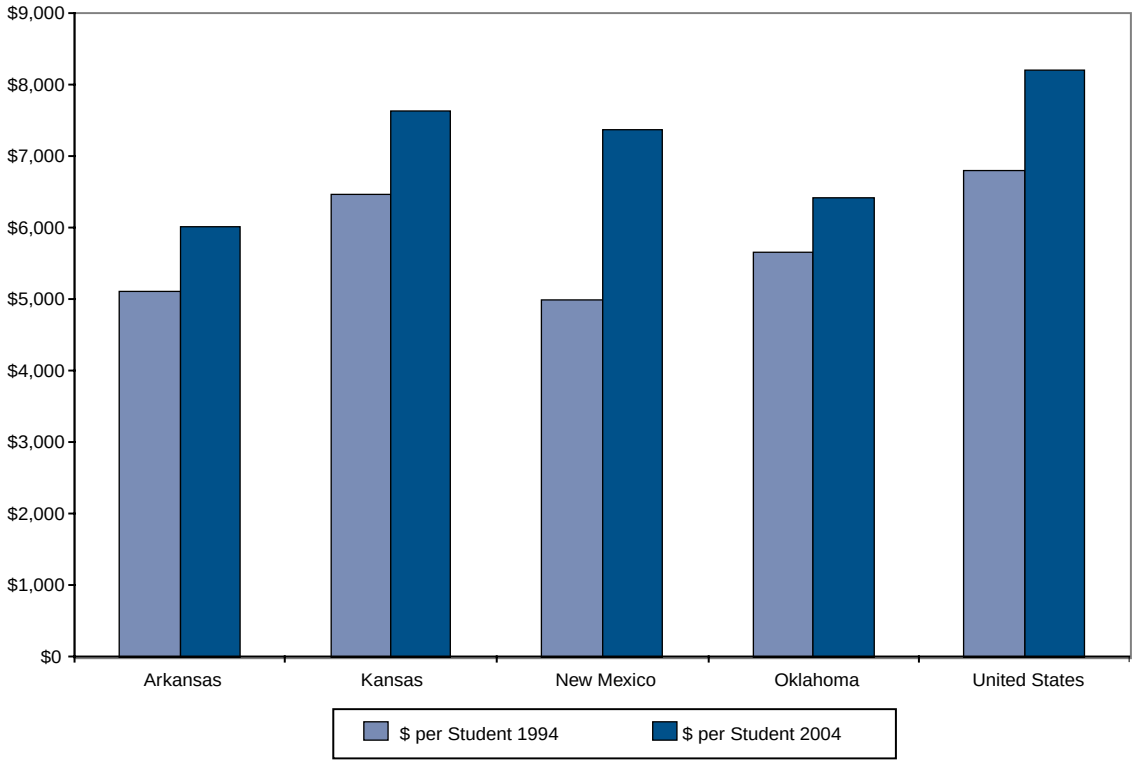

Source: National Center for Education Statistics at http://nces.ed.gov.

Since that time, uniform standardized test scores, such as the Iowa Test of Basic Skills and the Test of Achievement and Proficiency, have not been available over a sufficient time period to extend the study to more recent years. Their results, however, are suggestive. They find that a one percent increase in instructional spending per student is associated with a statistically significant increase in test scores of 0.2 to 0.3 percent. Similarly, a one percent increase in other spending per student is associated with a statistically significant increase in test scores of about 0.10 percent.[10] Although these results are not conclusive, they suggest that increased spending could have a modest effect on test scores. If these results could be applied to ACT scores, and we assume that a 1 percent increase in spending would increase test scores by 0.2 percent, we can calculate the increased spending necessary to increase the ACT from 20.4, which it was in 2005, to 20.5. It would take a 3 percent increase in spending per student. In 2004-05 spending per student was about $6,500; thus, a 3 percent increase would be $195. If we multiply this by the number of students in Oklahoma, about 630,000, we find that increasing the ACT score from 20.4 to 20.5 through increased spending might cost as much as $120,000,000.

Figures 5.4 and 5.5 provide another way to look at spending per student, students per teacher, and ACT scores. Figure 5.4 shows that each of the four states being considered, and the nation, increased inflation-adjusted expenditures per student from 1994-2004. Inspection of the figures shows that each of the four states had lower spending per student than the national average. Each of the states had a real increase in expenditures, with New Mexico having a much larger increase than the others and Oklahoma having a smaller increase.

**Figure 5.4**

**Expenditures per Student**
**(Selected States and Years)**




These differential increases show up in Figure 5.5 with larger decreases in the student-teacher ratio in Arkansas and New Mexico than in Kansas, and in increase in the student-teacher ratio in Oklahoma. But, as the figure shows, changes in the ACT scores show little relationship to the changes in resources per student.

The evidence suggests that inadequate funding is not the reason why U.S. students do not have world-class levels of math and science achievement. Although inadequate funding may contribute to Oklahoma's educational distress, feasible increases in funding are not likely to provide significant relief. Evidence suggests, however, that if additional funding is used efficiently or existing funding is used more efficiently, student performance benefits.

**Efficiency and Educational Performance**

The study by Adkins and Moomaw, previously mentioned, attempts to measure the size and determinants of inefficiency among school districts. They find on average that school districts in Oklahoma operate at 85 to 90 percent efficiency. In terms of ACT scores, which were not the measure of achievement in their study, this finding suggests that test scores might be increased substantially by increasing efficiency. If school districts operate at 85 percent efficiency, calculations suggest that increasing that efficiency to 90 percent would increase the Oklahoma Act average from 20.4 to 21.6. This substantial increase could occur without spending additional funds. The Adkins-Moomaw results suggest several ways to

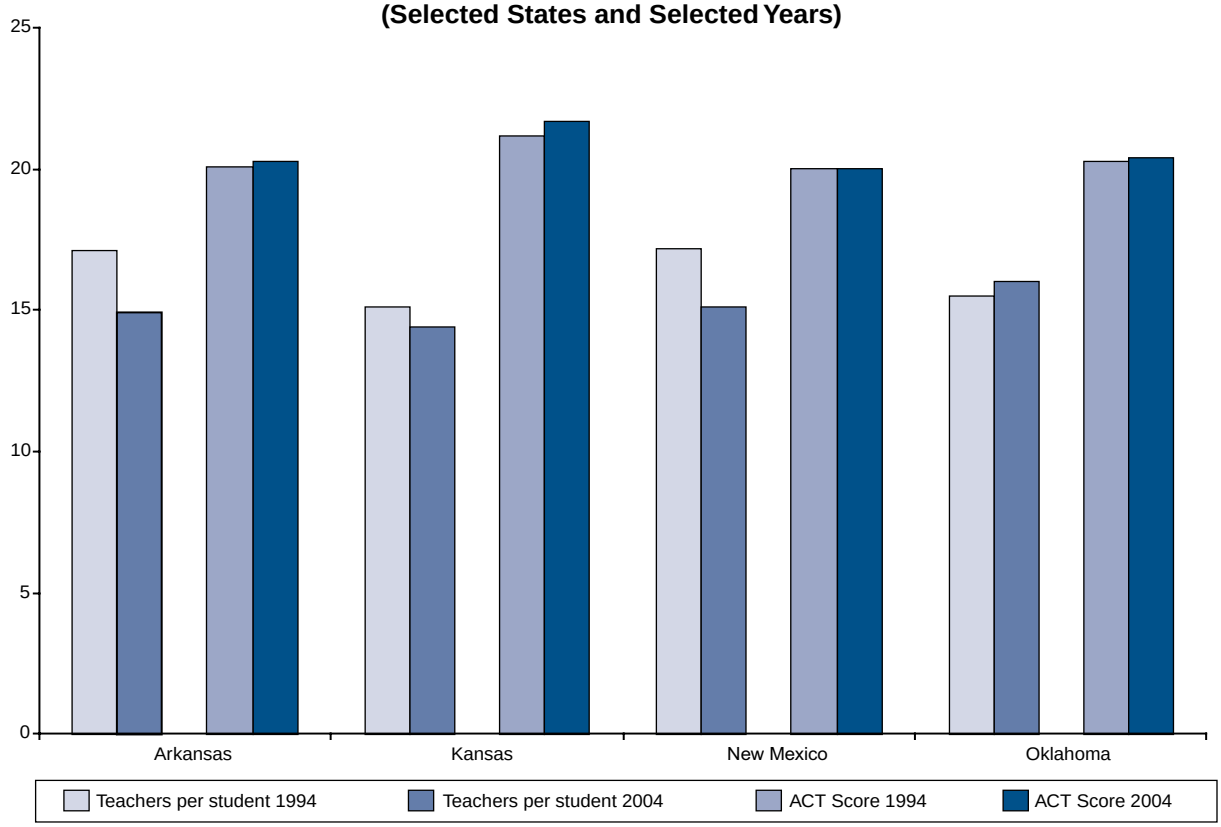
improve efficiency. First, their results suggest that many school districts are too small to operate at peak efficiency. Second, their results suggest that improvements in teacher quality, which would require higher teacher salaries, are a way to increase efficiency. To do so, holding spending constant, requires reallocating resources away from other uses. Finally, increasing the student-teacher ratio—larger class size—is another way to increase efficiency. The model suggests that larger school districts with more qualified teachers and larger class sizes are a more efficient way to produce student achievement.[11]

Another study by Adkins and Moomaw finds that greater local control, as measured by the relative importance of local spending in the district budget, is associated with greater efficiency.[12] These studies attempt to incorporate various aspects of the socioeconomic characteristics of the school district so that the results are not based on a situation where a high-income district is more efficient than a low-income district because of socioeconomic factors. Because their studies are based on secondary data, however, they do not provide insight into why schools in a more efficient school district obtain better results.

Wossmann's study of the countries participating in the 1995 TIMSS testing, however, provides some insights on efficient school organization. He tries to identify the pertinent features of school organization that contribute to the greater achievement of students in countries where they are more successful in math and science. He finds better performance, other things being equal, in countries with centralized examination systems, where the centralized exams influenced the curriculum.[13]

**Figure 5.5**

**Students per Teacher and ACT Scores (Selected States and Selected Years)**



The mechanism may be that the external exams make teachers more accountable and improve incentives for students.[14] In addition to centralized exams, Wossmann finds that the allocation of decision rights among the central government, local governments, the schools, and the teachers is very important. For instance, centralized decisions regarding curriculum and textbooks is associated with better student performance. On the other hand, students performed better in countries where the schools, themselves, had primary responsibility for hiring, evaluating, and rewarding teachers. Similarly, students performed better in countries where the teachers individually influenced curriculum and supplies, but did not perform as well in countries where teachers collectively (teachers' unions) influenced curriculum and school budget.

These findings suggest that, individually, teachers have knowledge of time, place, and student characteristics that they can use to enhance learning, if they have the decision authority. Collectively, however, teachers have incentives to reduce their workloads and increase their pay. These findings play out in the two main approaches to improving efficiency—accountability and choice. The federal No Child Left Behind (NCLB) legislation relies heavily on accountability of local districts and schools to state departments of education and the U.S. Department of Education. The NCLB approach might be termed "Improve or Else."

## "Improve or Else"

No Child Left Behind is an accountability approach that assumes that central planners or policy makers can establish goals, require testing, and develop pedagogy for schools to achieve better results. It provides some additional resources for failing schools and ultimately presents them with the stark alternative of improvement or closure. It requires that parents be given the option and the resources to move their children to other schools. NCLB had bipartisan support when it was passed. The bipartisan support for the act was generated when the choice elements in the original proposal were largely eliminated. It has since become politically charged, with the opposition asserting that the administration and congress have not supplied the resources necessary to implement the act.

### Accountability

The Education Commission of the States (ECS) is an organization that provides support to state policymakers and to the public on education policy. It asserts that NCLB has established "improvement of public education" as one of the highest national priorities. In its report to the nation on NCLB, the commission describes the goals of the legislation: "To eliminate gaps in achievement between students who have traditionally performed well in school and those who have not, and ensure all students are proficient in reading and mathematics by the 2013-14 school year; to guarantee every classroom in the nation is staffed by a highly qualified teacher; and to make all schools safer and more productive learning environments."[15]

The ECS is tracking the progress that states are making toward achieving these goals with over 2,000 indicators grouped into seven major categories: ". . . standards and assessments, adequate yearly progress, school improvement, supplemental services, safe schools, report cards and teacher quality."[16] According to ECS, in March 2004 all states were on track to meeting half of the 40 requirements of NCLB, and some states were much farther along. The ECS, however, saw several looming problems:

- Few states are on track to implementing high-quality professional development for all teachers.
- Only 10 states appear fully on track to ensuring that both new and veteran teachers are qualified to teach in their subject areas.
- Fewer than half the states are on track to making sure that scientifically based technical assistance is provided to low-performing schools.

- Many states do not have in place the technology infrastructure needed to collect, disaggregate, and report data at the school, district, and state levels. NCLB doesn't require the development of statewide data systems but, without them, states will have difficulty meeting a number of the law's requirements.[17]

Oklahoma is one of the leading states in meeting the requirements of NCLB. The state began a significant school reform movement in 1990 with the passage of House Bill 1017. As a result of this ongoing effort, it was well placed to implement many of the NCLB requirements. A number of national organizations have given the state high marks in its reform efforts. In January 2005, *Education Week* rated Oklahoma among the top 10 states.

*Princeton Review* rated Oklahoma's accountability systems highly. The Manhattan Institute rated Oklahoma among the top three states on the basis of public school choice among school districts, of which Oklahoma has many, and lack of restrictions on home schooling. The state has used incentives to encourage schools to offer and encourage Advanced Placement classes and to encourage teachers to obtain National Board Certification. In fact, the Oklahoma educational system is doing a good job in meeting many of the NCLB success measures.[18]

## High-Stakes Testing

The NCLB is an essentially top-down, 10-year plan to improve public education. Its innovations are to require testing of all students, to set performance goals, and to narrow group disparities in academic achievement. By setting performance standards based on testing and holding schools and districts accountable for achieving the standards, NCLB has introduced high-stakes testing for schools and, to a much lesser extent, students. High-stakes tests are *achievement tests* of the mastery of a broad subject area, not specific course content. They are *universal* in that all students at a certain grade level take them. A passing grade is established without reference to how others do on the test; therefore they use *absolute performance* standards. Finally the tests are *analytically oriented,* rewarding analytical and problem-solving skills more than memorization. These universal, analytical, achievement tests graded on absolute performance are "high stakes" because failing has consequences. For instance, many states, including Florida, Georgia, Louisiana, Minnesota, North Carolina, Texas, and Virginia base the type of diploma that students receive on such tests. The ACT test is designed as an analytical, achievement test, and can be considered high stakes in that it affects college scholarship opportunities.

High-stakes testing that holds students accountable can be expected to induce students to achieve more, but focusing the stakes on teachers and schools is designed to induce teachers and schools to get students to achieve more. It is an indirect approach that takes the current organization of public schools as a given and attempts to get better results. Apparently it can work. Evidence is accumulating that states with high-stakes accountability systems for public school systems have achieved some improvement in results on standardized tests. Martin Carnoy and Susanna Loeb measured student and school accountability by state and used this measure in an analysis of the factors affecting improvement in standardized test scores for eighth-grade math. Holding other things equal, they found that increases in their accountability measure were associated with increases in math achievement. Margaret Raymond and Eric Hanushek measure only state accountability and use it in a study that compares fourth-grade standardized test scores in 1996 with eighth-grade scores in 2000. They found that students in states with greater school accountability showed more improvement than in states with less. They also found, interestingly, that students in states that simply provided school report cards showed essentially the same improvement as those in states with strong accountability systems.[19]

In a series of studies summarized by Tom Loveless, John Bishop has found that high-stakes testing of students results in improved performance.[20] Many countries have high-stakes exit exams that are curriculum driven. Bishop finds that students from these countries do better on standardized international math and science

exams. In Canada, some provinces have exit exams; others don't. Bishop finds that students in the provinces with exit exams perform better on standardized tests. Interestingly, Michigan offers scholarships to students who meet certain standards on tests of core academic subjects. No penalties attach to failure. Nevertheless, the positive incentive of the scholarship is sufficient for improved overall achievement.

This program is similar to the Oklahoma Higher Learning Access Program (OHLAP), which, upon the student meeting certain curriculum and behavior requirements, provides scholarships automatically to students whose parents have incomes of less than $50,000 a year. The only performance requirement is that the student have at least an overall 2.5 grade point average, which amounts to half B's and half C's in the college core curriculum and overall. According to the ACT organization, the average grade point for the 700,000 or so students who take the ACT in 1003 was 3.2. The grade required for the OHLAP scholarship is substantially below the average grade earned by all the students who took the ACT. The OHLAP clearly improves accessibility for college, but, by using performance measures that are not necessarily absolute, the incentive effect of the program for high school students is minimal.

NCLB narrows the objectives of public education to some extent by focusing educators' efforts on core academic achievement. Schools that are not meeting certain objectives must refocus, or eventually they will suffer serious consequences. As noted in the analysis of high-stakes testing for student accountability, it is important that these objectives be appropriately chosen and that tests meet certain criteria. Developing and grading such tests is costly. If the tests are not carefully designed and administered, however, problems can develop.

At this time, many states have multiple-choice achievement tests. Although such tests have the advantage of being easy to grade, they also are limited in their ability to measure students' analytical knowledge of a field. The tests are also subject to manipulation by the state and by teachers. The greater the stakes for the teacher or the school, the greater the "temptation to skew the reports.... 'whether [in the words of the legislative report] by intentionally falsifying data, or simply stretching the rules to create more favorable data.'"[21]

Numerous reports exist of teachers, sometimes prompted by school administrators, actually helping students cheat on standardized tests.[22] Administrators in many school districts stretch the rules on universality, conveniently placing low-performing students in special education categories that exempt them from the test.[23] In addition to cheating and fudging the data, administrators and teachers distort the curriculum in an attempt to increase the pass rate. In Texas, many schools use a couple of months before the achievement test to drill students on techniques to pass the test. Math and English classes, and sometimes other classes, ignore the normal curriculum and "teach to the test." If the test was less predictable and more analytical, normal teaching practices would "teach to the test" without distorting the curriculum.

## Central Planning

No Child Left Behind is an experiment to determine whether increased control from Washington and from state departments of education can improve educational outcomes in the United States. Its emphasis on school accountability and increased focus on core academic achievement, both tied to extensive testing, are significant innovations. Its approach adopts and reinforces the current organization of public schools. One underlying, implicit hypothesis is that public education, in general, must narrow its focus; in effect, the federal government has seized the decision right to establish overall objectives of public education. Another implicit hypothesis is that schools and teachers are not performing well because they are unqualified, technically inept, or not trying. As seen in the ECS concern about looming problems, the NCLB solution is professional development of teachers and making sure that teachers are qualified to teach their subjects. This approach reinforces that top-down approach that state departments of education have tried over the years. The NCLB uses punitive measures applied to low-performing schools to provide

incentives to individuals for improvement. It does nothing to recognize the specific knowledge that teachers and principals have that could allow them to lower the cost of student achievement.

In an attempt to transfer this specific knowledge to central levels, state capitols, and the U.S. Department of Education, NCLB requires schools to provide detailed information to the states, and the states to Washington. The cost of doing so will be high. As the ECS says regarding looming problems, most states don't have the technology to accumulate and report the necessary information, and in the absence of sophisticated data systems, the states may be unable to meet the reporting requirements.

Another policy, parental choice, is becoming an important part of the policy dialogue. Forty-one states have provided for school choice by creating charter schools. A charter school gets public funding on a per-pupil basis and is exempt from many of the regulations that public school administrators must deal with. With its emphasis on parental choice, the charter school approach is one that relies on market-like mechanisms to improve children's educational experience. About 1 million students are in charter schools, with another 50,000, or slightly more, attending private schools with vouchers financed either from public education funds or private scholarship funds. In addition, about 1 million children are being home schooled. Finally, about 6 million children are in private schools. Thus, almost 15 percent of elementary and secondary students are not in traditional public schools. In addition, many children in public schools are in schools chosen by their parents based on their residential choice. Choice is at least as significant a policy initiative as No Child Left Behind.

## "The Consumer Is Always Right"

Competition among schools and choice for parents provide another approach to public school reform. As we have seen, choice is making inroads into the U.S. education system. Several states and cities, including Florida and Milwaukee, have instituted voucher programs targeted to low-income families. Private organizations are providing scholarships for low-income families to send their children to private schools. Charter schools are flourishing. Home schooling has grown tremendously. Before the charter school movement and home schooling, feasible choice existed only for families that had sufficient resources to make private school practical or to provide sufficient choice of housing location based on the quality of neighborhood schools.

Choice in Oklahoma is a mixed bag. Because of the numerous school districts and inter-district choice, Oklahomans who live in densely populated areas and who have good access to transportation are not tied to a school or school district based on where they live. In addition, Oklahoma has about 200 private schools with an enrollment of about 30,000 students and between 10 and 15 charter schools with an enrollment of about 4,000 students. Not counting the home schooled, about 5 percent of Oklahoma's students are outside the normal public school system. This contrasts with a national average of greater than 12 percent.

## Consumers Prefer Choice

Evidence from surveys in 1993 and 1999 shows that the parents of most of the students in private schools were "very satisfied" with the schools and their academic standards. In contrast, the parents of less than half of the students who attended assigned public schools were "very satisfied." The surveys showed that parents who had choice among public schools or had chosen schools by their choice of residence were more satisfied than parents whose children attended assigned public schools.

Higher income obviously provides greater opportunity to attend private schools, but it also provides better choice among public schools because it provides greater choice among places to live. About one-half of the students from families with a $30,000 income or less attend assigned public schools based on where their parents reside, which in turn is not chosen based on the local school system. Only 30 percent of students from high-income families attend assigned public schools.[24]

Why are parents and students more satisfied if they have choice among schools, such as private or charter schools? To succeed, the teachers in a private or charter school must offer a product parents demand. Because parents are more likely than politicians, education bureaucrats, and teachers to emphasize the well-being of their children, they would choose and evaluate schools that focus on their children's basic education and preparation for life after high school. For some children this would be a college preparatory curriculum; for others, it would be a curriculum focused on desirable vocational education. All graduates would have to meet certain state standards. Competition among schools would lead to a variety of educational programs well suited for their clientele, just as competition among colleges and universities does.

Although many people are skeptical about choice, Herbert J. Walberg, in a recent review of the research on the effectiveness of school choice, made the following observations, which counter some of the skepticism.[25]

- Most studies show that students whose families choose charter schools demonstrate improved performance on tests. Few if any studies find their performance getting worse. Parents are more satisfied with the charter schools. It is notable that the public cost of charter schools per pupil is less than for the regular public schools.
- Many studies show that choice improves performance of regular schools, as would be expected with competition.
- Parents use academic atmosphere as an important factor in choosing a school.
- Student performance is better at private schools, other things equal. A major difference between private schools and public schools is that the former tend to have stronger principals, more decentralized decision making, a greater focus on learning, closer parent-teacher interaction, and, in the former, parents who are dissatisfied move their possibly dissatisfied students to other schools.
- Limited evidence shows that choice serves students with disabilities well. In the choice schools, these students experience much less harassment and many fewer physical assaults.

One of the biggest concerns about choice is that it would increase segregation by race and income in the United States. Of course, choice for higher income people—private schools or exclusive suburbs—has already resulted in a great deal of segregation. We have not had enough experience with empowered school choice in the United States to evaluate its likely effect on the sorting of students by family, class, or ability. The available evidence suggests that parents are more satisfied, students are generally safer, and they develop civic virtue, but information about sorting is limited and inconclusive.[26]

England and Sweden provide some information. England has had some school choice since 1988. Its experience suggests that less sorting by socioeconomic status occurred after choice had been expanded than before, when choice was restricted by residence. Just as in the United States, in England the neighborhood school concept implies that upper-income families have choice, whereas lower-income families have less discretion.

In Sweden, families choose among regular (public) schools and independent (essentially charter) schools. Both types are tuition free, and the independent schools get reimbursed on a somewhat lower same scale than the regular schools. The independent schools must meet certain standards and have nondiscriminatory admission policies. The effect of the competition has been to improve achievement. Adverse side effects apparently have not occurred. In particular, low-income families are as likely to send their children to independent schools, as are high-income families. Thus, sorting does not increase. Moreover, the independent schools accept special needs students.[27]

## Choice Leads to Efficiency

The inefficiency of the U.S. public school system is, it can be argued, largely a result of its

organization and lack of competition. Like other publicly-owned enterprises, it lacks clearly specified objectives and it is much too centralized. Because the system is a public system with multiple and sometimes conflicting objectives, it is difficult for the decision makers to know and take the appropriate action. People who have much specific knowledge about particular students and the operation of a particular school—parents, teachers, and principals—lack sufficient authority to make decisions that they are best able to make. The people with the greatest stake in the operation of the public school system—students and parents—rarely have a meaningful role in its evaluation.

With the schools competing for students, their principals would evaluate teachers in terms of their success with students. We have good reason to believe that good teachers make learning easier for many students. Although quantitative measures such as experience and degrees are not particularly useful in identifying good teachers, principals and other teachers can identify them. If the principal is evaluated and rewarded by the ability of her teachers to motivate learning, that is, to teach well, the principal has the incentive to seriously evaluate teachers and use her specific information to identify and reward good teaching.

The teachers and principals who, along with students, make up the system can discern no clear relationship between their performance and their rewards. When administrators and teachers see a link between performance and rewards, they respond. Quoting Hoxby, "[P] ublic schools' responses do not depend just on whether they lose students; the responses also depend on the fiscal rewards and penalties attached to gaining or losing students. When competition has little fiscal implication, a public school is less likely to react. When cost competition is weakened by a large price wedge (like that between public and private schools), public schools reduce costs less than they do when cost competition is on a more level playing field (like that between two similar public school districts)."[28]

Some economists have long argued that competition among the providers of education will lead to existing public schools improving their performance.[29] Caroline Hoxby has studied the effects of existing competition (1) among suburban school districts, (2) within school districts, and (3) between private and public schools. She concludes that: "Public schools can and do react to competition by improving the schooling they offer and by reducing costs. They are not passive organizations that allow their students and budgets to be withdrawn without responding. Increased competition results in significant improvements in students' test scores, educational attainment, and wages."[30]

Many of Wossmann's findings about the delegation of some responsibilities from central educational agencies and others to the school and to the teachers make sense in this context.[31] The central agency provides a curricular framework and, along with the parents, sets objectives for the schools. School administrators are evaluated and rewarded on meeting these objectives. Consequently, the school administrators, consistent with Wossmann's results, become very involved in personnel policies—choosing, evaluating, and rewarding teachers—based on of meeting these objectives. Teachers affect the costs of student learning and the testing program and its consequences affect the benefits. Giving decision making authority to teachers permits them to use their knowledge and insight to reduce the cost of student learning—to teach well—again, just as Wossmann's study calls for.

## Oklahoma Educational Reform: Where Do We Go From Here?

Easy solutions to Oklahoma's lagging educational performance most probably do not exist. If they did, we probably would have already found them. Drastic changes in funding, accountability, or choice are unlikely. With government financing much education, accountability of the schools to politicians and politicians to tax payers is inevitable. One can argue that the assignment of decision rights about basic education to the state or national level—and perhaps the study of national and state history and political institutions—is appropriate because of the external effects of education. The centralized decision maker(s) could use testing to evaluate whether

schools are meeting these objectives. Finally, the national or state decision maker(s) could certify the schools that meet the standards and prohibit uncertified schools from operating with public monies. Accountability could be established through testing programs.

To the extent that the central authorities limit their objectives and to the extent that they permit principals, teachers, and parents to operate to meet these objectives without detailed planning requirements, efficiency—educational performance—can improve. Parents and students could have extensive choice among available schools for their children. Market-like forces would work to improve the performance of all schools as they attempt to attract students. It is important to remember that these market-like forces already provide many higher-income families with choice of schools for their children, either through private schools or residential choice. To narrow the equal opportunity gap, lower-income families could receive targeted vouchers that could be spent on education at the discretion of the family.

Joseph P. Viteritti implies that commutative and distributive justice require no less: "It is what parents think that will matter. Children will attend a particular school because their parents believe it to be the one that best accommodates their particular wants and needs—be it a district, charter, independent, or religious school. These choices will not be limited to families that are well off. The next generation of schooling will promote both liberty and equality."[32]

## Endnotes

[1]See the U.S. Department of Education's National Center for Education Statistics, *Pursuing Excellence: A Study of U.S. Twelfth-Grade Mathematics and Science Achievement in International Context,* NCES 98–049. Washington, D.C.: U.S. Government Printing Office, 1998. Available at the National Center for Education Statistics Web site: http://nces.ed.gov/fastfacts/ The countries are Australia, Austria, Canada, Cyprus, Czech Republic, Denmark, France, Germany, Hungary, Iceland, Italy, Lithuania, the Netherlands, New Zealand, Norway, Russian Federation, Slovenia, South Africa, Sweden, Switzerland, and the United States.

[2]See the *Trends in International Mathematics and Science Study* (TIMSS) 2003 at http://nces.ed.gov/timss/Results03.asp?Quest=4

[3]See the OECD Program for International Student Assessment (PISA) at http://www.pisa.oecd.org/index.htm for this international comparison of students across industrialized countries. For an alternative presentation of some of the material in this chapter see, Ronald L. Moomaw and Kent W. Olson, *Economics and Contemporary Issues*, 7th Ed., (Cincinnati, OH: Southwestern, 2007), Ch. 10.

[4]Totals for graduating seniors were obtained from *Knocking at the College Door—December 2003, Projections of High School Graduates by State, Income and Race/Ethnicity, 1998-2018*, © December 2003 by Western Interstate Commission for Higher Education.

2005 Average ACT Scores by State, © 2005 by ACT, Inc available at http://www.act.org/

[5]To make comparisons across states and over time it is important that participation be considered. Colorado went to 100 percent participation in the early 2000s and Texas has a much lower participation rate than the included states. Kansas's higher participation means that its higher scores are probably underestimated relative to Oklahoma.

[6]See *The Nation's Report Card*, the National Assessment of Educational Progress at the National Center for Education Statistics, U.S. Department of Education, http://nces.ed.gov/nationsreportcard/.

[7]See Summary of the Adequacy and Equity Litigation at http://www.okea.org/A&E/

[8]Ibid.

[9]Eric A. Hanushek, "Conclusions and Controversies about the Effectiveness of School Resources," *FRBNY Economic Policy Review* 4 (1998), 17–28.

[10]Lee C. Adkins and Ronald L. Moomaw, *Analyzing the Technical Efficiency of School Districts*. Presented at the Missouri Valley Economics Association Meetings, Kansas City, MO (27 October 2005).

[11]Ibid.

[12]Lee C.Adkins and Ronald L. Moomaw, "The Impact of Local Funding on the Technical Efficiency of Oklahoma Schools," *Economics Letters*, *81*, 2003, pp. 31-37.

[13]Ludger Wossmann, "Schooling Resources, Educational Institutions and Student Performance: the International Evidence," *Oxford Bulletin of Economics and Statistics*, *65*, 2003, pp.117-158.

[14]Kent Olson, "Higher Standards: A Key to Higher Achievement and Productivity," in *Improving Oklahoma's Schools: Issues and Choices*, *State Policy and Economic Development in Oklahoma: 1999,* Oklahoma 2000, Inc., 1999, provides an extensive discussion of the effects of high-stakes testing on student incentives and performance.

[15]Education Commission of the States, *State Implementation of the No Child Left Behind Act: Respecting Diversity Among States*, ECS Report to the Nation, (July 2004), p. iv

[16]Ibid.

[17]Ibid., p. v.

[18]See *Investing in Oklahoma 2005: The Progress of Education Reform, Volume 9* at http:/www.sde.state.ok.us.

[19]See Tom Loveless, "Test-Based Accountability: The Promise and the Perils," *Brookings Papers on Education Policy* (2005) 137-156, for a discussion of Martin Carnoy and Susanna Loeb, "Does External Accountability Affect Student Outcomes? A Cross-State Analysis," *Educational Evaluation and Policy Analysis* 24, no. 4 (2003): 305–311, and Eric Hanushek and Margaret Raymond, "High Stakes Research," *Education Next,* 3 (Summer 2003), 48–55.

[20]See Tom Loveless, "Test-Based Accountability: The Promise and the Perils," *Brookings Papers on Education Policy* (2005), 137–156.

[21]Peter Schrag, "Too Good to Be True," *The American Prospect,* January 3, 2000, 48.

[22]Labi Nadya, "When Teachers Cheat," *Time,* December 20, 1999, 86.

[23]Schrag, op. cit.

[24]Data from National Center for Education Statistics at NCES.ed.gov/index.html. See *The Condition of Education* (various years), *The Digest of Education Statistics* (various years), "Trends in the Use of School Choice: 1993-1999" (2003).

[25]See Herbert J. Walberg, "Comment," *Brookings Papers on Education Policy* (2005), 156–162.

[26]See Patrick J. Wolf, "Comment," *Brookings Papers on Education Policy* (2005) 162–168.

[27]See Herbert J. Walberg, "Comment," *Brookings Papers on Education Policy* (2005) 156–162 for a discussion of sorting in England and Sweden.

[28]Ibid., p. 55.

[29]Milton Friedman, *Capitalism and Freedom* (Chicago: University of Chicago Press, 1962), Ch. 6, "The Role of Government in Education."

[30]Caroline M. Hoxby, "What Do America's 'Traditional' Forms of School Choice Teach Us about School Choice Reforms?" *FRBNY Economic Policy Review,* 4 (March 1998), p. 55.

[31]Ludger Wossmann, "Schooling Resources, Educational Institutions and Student Performance: the International Evidence," Oxford Bulletin of Economics and Statistics, *65*, 2003, pp.117-158.

[32]Joseph P. Viteritti, "*School Choice: How an Abstract Idea Became a Political Reality*," *Brookings Papers on Education Policy* (2005) 137–156.

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