Measuring State and Local Government Labor Productivity: Examples from Eleven Services

U.S. Department of Labor
Alexis M. Herman, Secretary

Bureau of Labor Statistics
Katharine G. Abraham, Commissioner

June 1998

Bulletin 2495

Preface

In 1984 the Bureau of Labor Statistics outlined possible procedures for preparing State and local government labor productivity indexes in one of its bulletins.[1] BLS produced that publication in response to suggestions that it examine the feasibility of preparing such indexes by the Joint Economic Committee of the U.S. Congress, the National Research Council of the National Academy of Sciences, and the General Accounting Office. Following that publication, BLS conducted research on State and local government services. This led to a number of internal reports and publication of several measures as part of a bulletin entitled *Selected Industries and Government Services*, an annual BLS publication. The program was terminated in 1994 because of budgetary constraints.

This bulletin presents some of the data and findings produced by this research. It is presented here for the use of the State and local government research community and others who are interested in the subject of productivity measurement. Much of the data in this publication have not been published before; however, some of them are dated. Furthermore, BLS revised its industry productivity calculations and procedures since the research on State and local government was conducted. Thus, the State and local government and private sector methodologies often diverge. These issues are noted at several points in the text, particularly in the chapter that discusses conceptual considerations.

Donald M. Fisk and Mary M. Greiner prepared this bulletin under the supervision of John Duke and Mary Jablonski, supervising economists, and Kent Kunze, Chief, Division of Industry Productivity Studies, in the BLS Office of Productivity and Technology. A number of individuals inside and outside BLS reviewed parts of the manuscript. The authors would particularly like to thank Arie Halachmi, Tennessee State University; James Jarrett, University of Texas; John Neff and Larry Pham, American Public Transit Association; and Ronald Wilus of the Employment and Training Administration, U.S. Department of Labor. Eugene Becker, Division of BLS Publishing, edited the manuscript. Irma Mayfield, a Visual Information Specialist in the same division, designed the bulletin.

[1] For details, see *Measuring Productivity in State and Local Government*, BLS Bulletin 2166.

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Chapter I. Introduction, Summary, and Conclusions

State and local government employment and expenditures have risen dramatically over the past three and one-half decades. In 1960, State and local governments employed about 6.1 million workers, or 8.7 percent of the civilian labor force. They also spent about $47.6 billion on the purchase of goods and services, or 9.0 percent of the gross national product. By 1995, employment had risen to 16.5 million, or 12.5 percent of the civilian labor force, and spending increased to $841.7 billion for goods and services, or 11.6 percent of the gross national product.[1]

More people were employed by State and local government in 1995 than were employed in agriculture, mining, construction, transportation and public utilities, wholesale trade, or finance, insurance, and real estate. Of the major economic sectors, only manufacturing, retail trade, and services employed more people.[2]

Despite the importance and growth of State and local governments, there has been little interest in measuring the productivity of this sector.[3] Over the years, particularly in the 1970s, a number of organizations recommended research into State and local government productivity measurement. At one time the Joint Economic Committee of the U.S. Congress, the National Academy of Sciences, and the General Accounting Office each suggested that consideration be given to the measurement of State and local government productivity.[4] Each group recognized the problems associated with such an undertaking but nevertheless believed its importance warranted further investigation. But that interest waned and attention shifted to other concerns.[5]

Partly in response to the recommendations that emanated in the 1970s, the interest in Congress and the concern of the Office of Management and Budget, the Bureau of Labor Statistics (BLS) established a program to measure Federal Government productivity in the 1970s.[6] More recently, BLS supported research into the feasibility of producing State and local government productivity indexes, and for a while published several labor productivity indexes on a continuing basis.[7] Both the Federal and the State and local government programs were terminated in the 1990s. As part of the closure of this activity this bulletin presents some of the data and conclusions that have been gleaned over the past several years concerning State and local government productivity measurement.

Productivity defined

Considerable confusion surrounds the discussion of the basic concepts and procedures used in government productivity measurement. Public sector productivity literature has variously defined productivity as efficiency, effectiveness, cost reduction, reinvention, total quality management, management improvement, performance measurement, methods improvement, re-engineering, work measurement, and program evaluation.[8] In recent years, greater agreement seems to have emerged on the use of key terms. Nevertheless, it is important to define the terms used here because of past and, in some cases, continuing confusion in this area. Definitions of the more important terms used in this bulletin are presented in table 1.

Two terms, in particular, productivity and output, raise definitional problems. This bulletin uses them in their broad, generic sense, but they are also used to describe very specific, technical situations. Productivity is used to describe a variety of activities, terms, and procedures. But it also is used in its narrow economic sense to describe the efficiency with which resources are used to produce outputs, for example, productivity

indexes. The term output can also create confusion. Where possible its use is restricted to what organizations produce, that is, the services and products that are produced and delivered to citizens. But, at times, lacking any other suitable term, it is used to describe other organizational "outputs" including activities, outcomes, and impacts.

Another term that creates confusion is "public," like public utilities. Public utility service can be provided by government, non-profit or private regulated companies. Private and government organizations supply electricity, gas, water, mass transit, and alcoholic beverage store sales. The focus of this bulletin is on State and local government provided service.

This bulletin assigns government productivity measures to one of three categories based on the type of output measure. Output is used here in its generic or general sense. The three categories are: 1) Measures focusing on operational issues; 2) those focusing on organizational or program outputs, that is gross or direct outputs; and 3) those concerning organization or program consequences.

Operational measures are concerned with the internal workings or efficiency of an organization. Work measurement, which deals with resource requirements under a given technology or set of conditions, is a common operational measure. Intermediate activities or throughputs, such as the number of reports produced, number of audits completed, or the number of samples tested, and utilization measures, such as equipment downtime, are other types of operational measures. Each is important for day-to-day management of government.

The second category of productivity measures, direct outputs, is the final organizational output divided by the resources used to produce the output. The direct output productivity measure is the one most commonly used to compute private sector productivity, and the one used in this bulletin for public sector measurement. Public sector examples of such measures are the "tons of solid waste collected per employee hour" for sanitation services and the "revenue gallons of water sold per employee hour" for water utilities. These measures are also known as technical efficiency measures. They do not address the issue of whether the service should be produced or relate them to some desired goal. Rather, they are simply concerned with production efficiency.

The third category, consequences, addresses the issue of a program's affect on society and whether it makes optimum use of resources to achieve its goals. This type of measure is alternatively known as outcome, impact, effectiveness, and economic efficiency. Examples of these types of measures are "deaths prevented per employee hour" for fire departments and "jobs created per employee hour" for economic development agencies. Measures such as these focus on consumers and consumption whereas operational and direct output productivity measures are concerned with production relationships.

Although each of these general types of productivity measures is important, the most common type, at least nationally, is the direct output or technical efficiency measure. This type of measure is the one most often computed for the private sector and the one with which this study is primarily concerned.

The measurement of government and private sector productivity is similar in many respects. Both types of organizations produce goods and services, both compete in the marketplace to purchase resources, and both use varying combinations of resources to produce a product or service. As long as productivity measurements are restricted to direct outputs and the focus is on technical production issues, there should be great similarities in the measurement of the productivity of the two sectors.

Basic measurement issues

Specification and measurement of output is the most difficult problem in measuring the productivity of State and local government. The basic measure of output should be a homogeneous physical unit, with the unit measure of output related to the resources spent in its production. Where a government provides a single service—solid waste disposal and drinking water are examples—the output can be simply a count of the units

Table 1. Terminology of government productivity measurement

Term	Definition
Activity	A task performed by an organization to produce a desired output. Examples include miles driven, trucks serviced, and meters read. Sometimes described as workload.
Compensation	Total labor costs including salaries, wages, and benefits.
Consequence	The desired results of government programs or services such as improved citizen safety, increased longevity and reduced infant mortality. Often described as impacts and outcomes.
Effectiveness	The degree or extent to which program goals are met, such as the percent of population served or percent of clients successfully treated.
Efficiency	The ratio of output to inputs such as work performed per staff hour or downtime as a percent of total hours. Includes productivity, unit costs, and technical efficiency.
Function	A government service such as police, fire, and water supply. Function and service are used synonymously.
Goal	A statement which describes what is to be accomplished by a program, service, or agency. A goal of public safety is to insure a safe and secure environment.
Impact	The long-term effect of a program on a community or its citizens. Impact and consequence are used synonymously. See Consequence.
Input	The resource used by an agency to produce a function, service, program, or activity. Examples of inputs are labor, facilities, equipment, and materials.
Outcome	Short-term impact or consequence of government action or output, such as employment service job placements. See Consequence.
Output	Generically, any government operation, activity, or consequence. Specifically, the goods or services produced by an agency. Examples of specific outputs are the gallons of revenue water delivered, the tons of trash collected, and the kilowatt hours of electricity sold.
Productivity	Generically, any process which improves the efficiency or effectiveness of government services. Specifically, the efficiency with which resources are used to produce outputs; also, technical efficiency. Examples of technical efficiency are gallons of revenue water delivered per labor hour and tons of trash collected per labor hour.
Productivity index	The ratio of output to input referenced to a base year.
Public	Service provided to the community or general public by the government, non-profit, or private, regulated company.
Service	A government function such as police, fire, or education. The terms service and function are used synonymously.
Throughput	Activities or tasks performed to produce an output. See Activity.
Unit cost	The cost of producing one unit of output.
Unit labor cost	The labor cost (compensation) of producing one unit of output.
Unit labor requirement	The labor required to produce one unit of output.
Workload	The amount of work performed, usually an intermediate output, such as the number of miles driven or the number of machines serviced. See Activity.

of service. However, many governments produce a number of heterogeneous services, such as fire, police, ambulance, health, and education, and it is not always easy to identify even the basic services in such cases.

Furthermore, many government services consist of a number of different subservices or products. The Unemployment Insurance program, for example, screens applicants, establishes eligibility, writes checks for those eligible, and audits businesses to ensure that they contribute the required taxes. For some government services it is difficult to even identify the outputs. For example, what are the outputs (not consequences) of police and education services?

In addition, productivity measurement requires that the service units be homogeneous through time. However, in many instances, the scope and dimensions of government services are constantly changing. Many transit systems now provide dial-a-ride or demand response services in addition to regularly scheduled bus service, and some jurisdictions have added the testing of automobile emissions to safety inspections. In both cases the service unit has changed or expanded.

Quality and level of service considerations are also important for productivity measurement because of their potential impact on the resources required to produce a unit of service. Outputs or inputs should be adjusted when service or product shifts affect unit costs. Movement of solid waste collection from backdoor to curbside pickup and improvement of drinking water quality to conform with environmental standards affect unit costs, and productivity measurement needs to account for such changes.

Selection of the proper measure of output requires a service-by-service and product-by-product examination. By dividing a service, it is usually possible to identify homogeneous outputs with reasonably stable unit costs. The difficulties with this approach are the lack of research to identify the correct units and the lack of data with which to make the calculations.

Data to calculate State and local government output indexes often are lacking. The Federal Government collects some data, particularly in those areas where it has shared responsibilities, such as unemployment insurance and drinking water. National associations and public interest groups collect other data. These statistics are often inaccurate and incomplete. But more often than not, national statistics are simply unavailable on State and local government output.

The output indexes calculated and presented in this bulletin use a base year weighted index (Laspeyres index) when combining multiple outputs. The weights were revised every 5 years, and the indexes were linked. BLS used this procedure in its industry measurements for many years. Recently the Bureau shifted to Tornqvist weighting in calculating its private industry measurements.[9] For most government services, either procedure is appropriate, and the trends should not be greatly affected by the procedure used.

The measurement of input is often used to characterize the type of productivity measure. A common division is single factor, such as labor, or multifactor, such as labor and capital. In reality, there is a continuum of inputs or factors of production.

The most frequently used measure of input is labor, constituting over half of all State and local government operating expenditures. Labor is important for public policy considerations, is easy to calculate compared with other factors of production,and is the most accessible of State and local government factor inputs. It is the measure used here.

The labor measure that is used most frequently for private sector measurements is labor hours. However, no national statistics exist on State and local government labor hours; few governments even collect such data. The measure most often used by State and local governments is the number of full-time-equivalent employees, which is equivalent to the hours measure for calculating trends. Many governments also keep statistics on the number of employees, a measure often used in the private sector productivity calculations.

None of the sources of national statistics are entirely satisfactory for computing State and local government labor productivity indexes. National statistics collected through

the Bureau of the Census' Census of Governments program, the Employment Service's ES-202 reports, and the Bureau of Labor Statistics' Current Employment Statistics survey (CES-790) are not separated and categorized in small enough units to be used to compute labor productivity indexes for individual services. In a few instances, Federal Government programs, such as the Department of Labor's Unemployment Insurance program and the Department of Transportation's Federal Transit Administration, collect State and local government employment statistics in their areas of concern. However, comparisons of labor data drawn from these and other sources reveal considerable discrepancies from source to source.

In summary, no single source of labor data on State and local government is adequate to compute national labor indexes. Construction of viable labor indexes, like viable output indexes, requires detailed comparison and adjustment of data.

Each productivity or labor productivity index presented in this bulletin is an output index divided by the labor index. The term productivity, in this case, is used as an abbreviation for output per employee. Only those services produced by State and/or local government employees are included in the measures presented here. The period covered by the indexes is primarily a function of data availability.

Many factors affect the indexes presented in this bulletin. Oil embargoes affect the use of mass transit, determinant sentencing laws affect the number and type of persons held in prison, deregulation affects the consumption of natural gas, and recessions affect the output of State unemployment insurance offices. Although such considerations shape the production of government services, no attempt is made to assess their impact or adjust the labor productivity indexes.

This bulletin presents labor productivity indexes as the relationship of the output of the service to the labor required to produce the output. The indexes do not measure the specific contribution of labor, capital, or any other factor of production. Rather, they reflect the joint effect of many influences, including changes in technology, capital investment, capacity utilization, skill, and effort of the work force, managerial ability, and legislation and regulation.

Services examined

This bulletin examines 11 State and local government services and presents labor productivity indexes for 10 of them. The more important government services, including education, police, and fire are not included because of conceptual and/or data problems.

Five of the services operate in a manner similar to private enterprises, that is, they cover a significant portion of their expenses through fees and charges. (They will be referred in this bulletin as "enterprise services.") They are electric power, natural gas, drinking water, mass transit, and alcoholic beverage sales. Four services cover the corrections field. Calculations are presented for three—prisons, jails, and juvenile institutions. Data are not available for the fourth—probation and parole. The final two services—unemployment insurance and the employment service—relate to employment security. Each of the 11 services is briefly discussed below. Productivity indexes are presented for 10 services in table 2, and chart 1 shows 5 productivity indexes for 4 services. Mass transit has two different indexes. Chapter 3 discusses this variation.

Electric power. Considerable research has been conducted into private electric power productivity, and considerable data are collected on private and public utilities. Most electricity in the United States is generated and sold by private utilities. In 1992, however, there were about 2,000 State and local government electric power utilities, employing about 85,000 workers. From 1967 to 1992, labor productivity of State and local government electric power systems increased at an average annual rate of 2.1 percent, output (kilowatt hours sold) was up 3.6 percent, and labor input increased 1.5 percent. Labor productivity growth was fairly robust from 1967 to 1977 but grew little from 1977 to 1992.

Table 2. Labor productivity indexes for 10 State and local government services, 1967-92
(1987 = 100)

Year	Electric power	Natural gas	Water supply	Mass transit trips[1]	Mass transit miles[2]	Alcohol beverage sales	State prisons	Local jails	Juvenile institutions	Unemployment insurance	Employment service
1967	65.0		80.5	164.9	120.2	75.7				88.4	
1968	71.7		82.3	162.1	119.8	76.2				83.9	
1969	81.5		80.6	159.1	119.5	77.1				81.8	
1970	84.9		80.1	151.6	121.5	76.4		150.2		90.6	
1971	88.0		80.4	139.9	118.4	81.0			125.6	103.0	
1972	89.5		82.2	132.8	116.4	83.9			115.4	89.8	86.6
1973	88.8		82.4	127.5	117.3	89.2	99.1		105.0	88.8	100.4
1974	88.1	127.4	79.9	122.4	114.1	90.0	100.6		102.3	101.1	102.4
1975	89.6	123.6	82.1	120.7	113.4	92.9	108.0		102.1	123.6	100.5
1976	94.5	120.9	81.2	117.2	113.7	93.6	109.4		96.2	109.0	105.5
1977	103.4	118.8	81.1	117.9	113.9	96.7	108.3		90.6	95.3	109.4
1978	101.5	120.1	77.8	118.0	112.2	98.6	109.5	97.0	88.9	84.5	111.9
1979	103.7	120.0	86.7	125.3	111.4	100.4	106.3	95.1	87.3	79.5	114.1
1980	105.2	127.7	86.1	122.6	108.0	99.8	109.3	92.6	89.7	100.3	113.1
1981	103.2	125.5	87.4	119.5	107.9	99.7	109.4	98.5	92.1	92.7	109.1
1982	100.7	115.8	84.3	113.0	106.0	102.0	111.2	107.3	94.5	106.4	106.8
1983	98.7	114.0	86.3	110.8	104.6	104.0	108.7	107.0	96.9	110.1	104.7
1984	97.3	119.1	90.5	113.1	104.1	104.9	102.9	102.9	96.0	93.8	106.1
1985	97.8	104.7	95.8	106.6	100.6	99.2	102.3	103.8	95.0	97.4	105.4
1986	97.4	94.4	98.3	103.4	101.4	96.4	102.5	104.6	97.6	101.8	104.7
1987	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1988	105.0	99.0	99.4	99.3	103.0	97.9	98.5	106.5	100.6	98.1	
1989	108.1	97.0	101.4	98.8	104.6	97.8	101.3	105.9	101.2	98.4	
1990	110.2	92.6	99.2	97.1	106.4	98.2	100.9	95.2	99.9	108.5	
1991	110.9	95.3	93.2	93.9	105.5	98.0	100.6	89.6	98.7	117.3	
1992	108.1	95.7	92.9	97.4	106.9	100.5	100.3	87.2	100.1	121.8	
Average annual rate of change:											
1967-92	2.1		0.6	-2.1	-0.5	1.1				1.3	
1970-92	1.1		.7	-2.0	-.6	1.3		-2.4		1.4	
1974-92	1.1	-1.6	.8	-1.3	-.4	.6	0		-.1	1.0	
1972-87	.7		1.3	-1.9	-1.0	1.2			-.9	.7	1.0
1967-77	4.7		.1	-3.3	-.5	2.5				.8	
1977-92	.3	-1.4	.9	-1.3	-.4	.3	-.5		.7	1.6	
1967-72	6.6		.4	-4.2	-.6	2.1				.3	
1972-77	2.9		-.3	-2.3	-.4	2.9			-4.7	1.2	4.8
1977-82	-.5	-.5	.8	-.8	-1.4	1.1	.5		.9	2.2	-.5
1982-87	-.1	-2.9	3.5	-2.4	-1.2	-.4	-2.1	-1.4	1.1	-1.2	-1.3
1987-92	1.6	-.9	-1.5	-.5	1.3	.1	.1	-2.7	0	4.0	

[1] Unlinked passenger trips.
[2] Vehicle revenue miles.

Natural gas. For the most part, it is the private sector that distributes and sells natural gas. In 1992, however, about 950 local governments sold natural gas. They employed about 11,000 individuals to handle natural gas operations. Over the 1974-92 period, local government natural gas labor productivity decreased at an average annual rate of 1.6 percent. Output (BTU's sold) decreased annually at 0.7 percent while labor increased 0.9 percent. There are two distinct productivity trends in the measured period: decreases from 1974 until the mid-1980's, then little change.

Water supply. In contrast to electric power and natural gas, drinking water operations are largely government owned and operated. There were about 17,800 government water systems and they employed about 157,000 workers in 1992. From 1967-92, water-supply labor productivity increased 0.6 percent annually. Until the late 1970s productivity growth was flat; between 1978 and 1990 it increased at a moderate rate, but it dropped in 1991 and 1992. For the entire 1967-92 period, output, which is measured by deflated revenue, increased 1.8 percent annually while labor increased 1.2 percent.

Mass transit. Both labor and output increased rapidly in the mass transit field, particularly in the 1970s and early 1980s, as government absorbed failing transit systems and expanded service. Between 1967 and 1992, the average annual increase in labor was 2.6 percent. Two outputs, vehicle revenue miles and passenger trips, are commonly used to assess transit output as discussed in chapter 3. The average annual increase in vehicle miles was 2.2 percent between 1967 and 1992 and for passenger trips, it was 0.5 percent. For 1967-92, vehicle revenue mile labor productivity dropped 0.5 percent per year while passenger trip labor productivity decreased 2.1 percent.

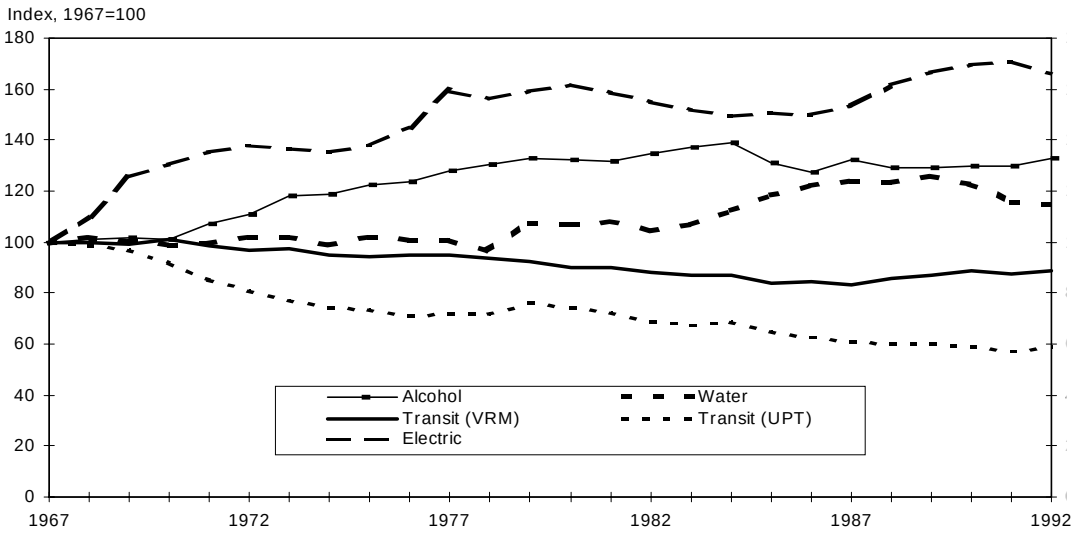
Alcoholic beverage sales. Seventeen States sell alcoholic beverages. Two distinct periods mark State operations. From 1967 to 1979, there was substantial growth in output (gallons sold) with an average annual increase of 2.9 percent. But from 1979 to 1992 output shrank at an annual rate of 2.8 percent as the States turned their operations over to the private sector and per capita purchases of spirits dropped. The average annual change in labor input was 0.5 percent between 1967-79 and -2.8 percent between 1979-92. Productivity grew by 2.4 percent between 1967-79 but had zero (0) growth over the 1979-92 period. The long-term average annual change was 1.1 percent for productivity, -0.1 for output, and -1.2 for labor input.

State prisons. One of the fastest growing State government operations is prisons. In 1990, the States operated over 1,200 prisons and employed about 246,000 persons. Between 1974 and 1992, the average annual increase in output (number of inmates differentiated by level of security) and labor input was the same, 7.8 percent. Average labor productivity was flat.

*Local jail*s. Jail output and labor input also increased in a dramatic fashion. Between 1970 and 1992, output increased at an average annual rate of 4.7 percent and labor input increased 7.3 percent. The result was an average annual decrease in labor productivity of 2.4 percent. There were two distinct periods of change. Between 1970 and 1978, productivity decreased 5.3 percent per year, and between 1978 and 1992 the decrease was 0.8 percent per year.

Probation and parole. The number of individuals under community probation and parole has increased dramatically over the past several decades. In 1976, the first year for which comparable data are available, approximately 1.1 million probation and parole offenders were under supervision; by 1992 this figure had grown to 3.4 million. Data are lacking on individual services provided so an output index cannot be calculated. The number of employees doubled during this period.

Chart 1. Five State and local government labor productivity indexes, 1967-92



Juvenile institutions. By 1992 there were over 1,000 State and local government operated juvenile institutions, an increase of about 50 percent since 1971. However, there were only 58,000 residents and 62,000 employees in this very labor intensive service in 1991. From 1971 to 1992 output (number of residents) was reasonably flat while labor input rose at a fairly constant rate (1.4 percent annually). The result was an average annual drop in labor productivity of 1.1 percent. However, there were two very distinct periods of change during this period, which are driven by changes in output. From 1971 to 1979 output decreased at an average annual rate of 3.1 percent, but from 1979 to 1992 it increased at a 2.5 percent rate. The result of this shift is a drop of productivity (4.5 percent annually) between 1971 and 1979 and a slight increase (1.1 percent annually) between 1979 and 1992.

Unemployment insurance. This joint Federal-State program is driven by changes in output which largely reflect changes in the number unemployed nationally. All States operate this program, and in 1992, it had over 46,000 State employee positions or full-time equivalent employees. The long-term (1967-92) average annual increase in output is 3.7 percent, for labor input it is 2.3 percent, and for labor productivity it is 1.3 percent. More interesting, perhaps, than the long-term increase is the cyclical change. During the five cyclical periods between 1967-92, increases and decreases in output were accompanied by increases and decreases in labor input, a situation common in the private sector but unusual in government.

Employment service. This joint Federal-State program has been buffeted by change in recent years, and probably has fewer than 20,000 employees today. Labor productivity shows a 1.0 average annual percent increase from 1972 to 1987. During this period output (services provided) remained relatively stable while labor input decreased by 0.9 percent annually. However, there were two distinct periods of change. From 1974 to 1979, labor productivity increased 2.2 percent per year, but from 1979 to 1987, it decreased 1.6 percent annually.

Summary

Long-term labor productivity trends for the 10 measured services show productivity increasing for 6 services and decreasing for 4. The time period covered, however, can dramatically affect the trends of each. Only two services, natural gas and mass transit (unlinked passenger trips), show robust and unequivocal change over the entire measured period, and both show decreasing productivity. Output and labor input increased for most of the services as expected, given the large growth of government over the past 25 years. Two services, natural gas and alcoholic beverage sales, register long-term decline in outputs and two, the Employment Service and alcoholic beverage sales, had decreases in labor input (table 3).

Conclusions and observations

Although the 10 services do not comprise a sample from which one can assess the condition of State and local government productivity, they do provide a base for discussing some of the commonly asked questions about the subject. Also, examination of these services should help develop additional insights into the efficiency of State and local government operations, and possibly service productivity as a whole.

How is State and local government productivity changing? With the growth of State and local government over the past three decades, continuing attempts to trim government operations, and the slowdown in private sector productivity, questions have frequently been raised concerning the change in government productivity. The U.S. national income accounts assume zero change in government productivity; other countries make different assumptions. Several researchers have examined and discussed the potential impact of changing government productivity on aggregate national labor productivity statistics.[10] But the discussion remains largely anecdotal and illustrative. Clearly, the sample of 10 services selected from 3 general areas is not adequate to answer this question, but the sample does provide additional insights to our state of knowledge.

Table 3. Average annual rate of change in output, labor, and labor productivity for 10 services, selected periods
(in percent)

Service (years measured)	Output	Labor input	Labor productivity
Electric power (1967-92)	3.6	1.5	2.1
Natural gas (1974-92)	-.7	.9	-1.6
Water supply (1967-92)	1.8	1.2	.6
Mass transit(upt) (1967-92)	.5	2.6	-2.1
Mass transit(vrm) (1967-92)	2.2	2.6	-.5
Alcohol beverage sales (1967-92)	-.1	-1.2	1.1
State prisons (1973-92)	7.8	7.8	.1
Local jails (1970-92)	4.7	7.3	-2.4
Juvenile institutions (1971-92)	.3	1.4	-1.1
Unemployment insurance (1967-92)	3.7	2.3	1.3
Employment service (1972-87)	0	-.9	1.0

The sample results suggest that the long-term labor productivity trends for individual State and local government appear to be quite variable: some services increase, some decrease, but most lack direction.

How does State and local government productivity compare with private sector productivity? The search for greater efficiency in government services often results in calls for privatization or contracting of government operations, the argument being that the private sector is more efficient than government. But data are rarely available with which to test this proposition and any meaningful comparison of government and private sector productivity is notoriously difficult. The statistics presented here offer very limited information on this subject.

In the overall aggregate *business* sector, there is an average annual increase in labor productivity of 1.4 percent between 1967 and 1992. No comparable statistic exists for State and local government.

On the other hand, many State and local government services have private sector counterparts. This bulletin looks at three of them: Electric power, natural gas, and alcoholic beverage sales. In each case the trends of government and private sector labor productivity are compared.

Electric power and natural gas show remarkably similar movements to their private sector counterparts. The average annual increase in government electric power labor productivity is 2.1 percent; for the private sector it is 2.3 percent. Both series cover

1967-92. For natural gas, government labor productivity dropped 1.6 percent annually while the private sector dropped 2.2 percent; both of these series cover 1974-92. The outputs of both the private sector and government are measured in the same way.

State alcoholic beverage sales present a slightly different picture. Government and private sector labor productivity each increased at the same annual rate—0.9 percent—between 1972 and 1992 but they show very different periods of growth. State government productivity increased substantially prior to 1980 while the private sector showed its greatest growth since the mid-1980s. Some of the variances may be due to measurement differences (in the case of outputs, physical quantity was used for government and deflated value for the private sector). Other differences may be due to different coverage (government output reflects wholesale and retail sales of alcoholic beverages only, the private output reflects only retail sales but also includes sales of merchandise in addition to alcohol). And some differences may be due to data problems, and some may be due to real productivity differences.

Any comparison of private and government services, no matter how closely analyzed, is subject to numerous caveats. First, the two sectors rarely produce exactly the same service as demonstrated by alcoholic beverage sales. Even electric power has a different mix in the type of sales and generation. Second, rarely do comparable institutional and environmental situations exist. Third, the data are almost always drawn from different sources and cover different periods. Finally, these comparisons of private and government productivity are comparisons of productivity trends. Productivity levels, such as units produced per employee, may be different.

A definitive statement about the relative efficiency of State and local government versus the private sector based on the services examined here cannot be made. Nevertheless, it is interesting that the government and private sector productivity trends for the three services move in the same direction, and two at about the same rate.

What is the relationship between the change in output and productivity? Analyses of private sector operations show that large increases in output usually accompany jumps in productivity and decreases usually lead to dropping productivity. Similar phenomena have been noted in a study of Swedish government productivity.[11] Some of the same phenomena are evident in the 10 services examined here (table 3).

With the exception of alcoholic beverage sales, a drop in output almost always resulted in a drop in labor productivity for the 10 services. Productivity for 4 of the 10 services—electric power, water, juvenile institutions, and the Employment Service—decreased *every* year that output dropped. In the case of natural gas it dropped in 9 out of 10 years and transit (unlinked passenger trips) dropped in 10 of 11 years. Employment is not adjusted in the face of falling output, at least not immediately, for these services. Alcoholic beverage sales are the exception. In this case there were major shifts from government to private retail operations that resulted in the closing of a large number of State retail stores. Although service outputs decreased there were even greater decreases in inputs with the result being increases in labor productivity.

The situation is very different when output increases. Private sector studies note that increases in output almost always lead to increasing productivity. However, only 2 of the 10 services, UI and alcoholic beverage sales, show a close correlation between increasing output and increasing productivity. For the other services, output and productivity increased in the same year about half of the time. And for two services, transit (unlinked passenger trips) and jails, increasing output was most often accompanied by decreasing productivity. For transit trips, output and productivity increased in the same year only 30 percent of the time, and for jails it was 27 percent of the time.

These movements are a reflection of a number of institutional factors that operate almost independently of each other. In the case of jails, output increased rapidly throughout the entire measured period, as did staffing. However, labor input actually expanded more rapidly than output. Employees are hired before inmates are placed in the facilities because of the need for training and employee security clearances, and the courts have required additional staffing for many facilities. Mass transit (unlinked passenger

trips), on the other hand, is a service that is supply driven. More and more service has been provided which has resulted in greater use, but not at the same rate as employment has increased. During the time of the oil embargoes transit output jumped ahead of inputs but this was atypical.

Does the selection of the output measure affect the productivity trend? The measurements in this section focus on government outputs. Other measures focus on activities, outcomes, and effects. The question becomes: Does the type of measure affect the rate of change? The answer is that it often makes a difference, and sometimes a sizable difference.

There are three services—transit, unemployment insurance, and employment services—for which more than one output measure was calculated. Two measures were calculated for transit, vehicle revenue miles (VRM) which increased at an average annual rate of 2.2 percent and unlinked passenger trips (UPT) which increased at an average annual rate of 0.5 percent. Vehicle revenue miles are categorized as the service supplied or capacity provided and the unlinked passenger trips as the output. However, the transit industry views the revenue miles as an output and the passenger trips as an outcome. There is considerable difference in the rate of change between the two measures, and these differences are apparent in modal calculations too.

Two measures were also calculated for Unemployment Insurance. The program (multiple service) measure includes both benefit and tax operations; it increased 2.5 percent annually. A unitary output measure, weeks compensated, increased 3.7 percent annually. Three measures were calculated for Employment Service. They are: Placements which is a measure of outcome; referrals which is a unitary measure of output; and a service-based measure (training, testing and referrals) which is also a measure of output although some might describe it as a measure of multiple activities. The long-term rates of change for these measures are 1.0, 0.9, and 0 percent, respectively.

Not only do the service measurements vary by type of measure, but also the rate of change of each measure may vary by the period examined. For example, the three Employment Service measures show exactly the same rate of change (-3.3 percent) for one peak-to-peak output cycle (1979-86), but for the preceding cycle (1974-79), the rate of change was 4.6 percent for placements, 3.8 percent for referrals, and 2.1 percent for the service-based measure (table 4).

Table 4. Comparison of rates of change for output measures for three services, selected periods 1964-92

Measure	Rates of change		
Mass transit	**1967-92**	**1970-81**	**1981-84**
Unlinked passenger trips	.5	1.5	-0.4
Vehicle revenue miles	2.2	2.6	.3
Unemployment Insurance	**1964-92**	**1967-72**	**1972-76**
Program	2.5	2.2	16.4
Weeks compensated	3.7	4.9	22.2
Employment Service	**1972-87**	**1974-79**	**1979-86**
Placement	1.0	4.6	-3.3
Referral	.9	3.8	-3.3
Service	.0	2.1	-3.3

SOURCE: Tables 31, 66, and 73

Do weighted and unweighted output trends differ? The desirability of differentiating and weighting service output is discussed at several points in this bulletin. However, the process often requires considerable data and effort to calculate weighted output indexes. The questions are, how much difference does it really make? And, if it makes a difference, is it worth the effort?

Nine of the 10 service output measures presented in this bulletin are differentiated and base-year weighted. Two, UI and ES, employ different outputs in the weighted and unweighted measure, and for this reason are not considered further. The remaining seven—electric power, natural gas, drinking water, mass transit, alcoholic beverage sales, prisons, and juvenile institutions—use the same basic measure in the weighted and unweighted output and can be directly compared.

Table 5. Comparison of rate of change of weighted and unweighted output for seven services, selected periods 1967-92

Service and period	Output	
	Unweighted	Weighted
Electric power (1967-92)	3.5	3.6
Natural gas (1974-92)	-1.0	-0.7
Water supply (1967-92)	1.7	1.8
Mass transit trips (1967-92)	.5	.5
Mass transit miles (1967-92)	2.2	2.2
Alcohol beverage sales (1967-92)	.3	-.1
State prisons (1973-92)	7.7	7.8
Juvenile institutions (1971-92)	.2	.3

SOURCE: Tables 11, 18, 23, 31, 39, 49, and 61

Examination of the long-term weighted and unweighted trends for the seven services show little difference (table 5). There is not much difference in the trends because there was little change in the composition of the outputs in these services in the periods studied. Only one service, State alcoholic beverage sales, shows a reversal in the sign as a result of the weighting; this reflects the move by several States from retail to wholesale-only operations. Natural gas weighted and unweighted outputs also show a modest difference, although not a reversal in the sign; this difference is due to the relative shift in sales from industrial to residential service. The other five indexes show little or no difference between the weighted and unweighted output indexes.

Measurement outlook

This discussion has illustrated some of the possibilities and problems in computing State and local government productivity indexes at the national level. The problems are substantial and include both conceptual and data issues. However, the difficulties should not be any worse for calculating State and local government productivity than for calculating private sector service industry labor productivity trends.

The two sectors produce many of the same services. There are literally dozens of such services, ranging from electric power to alcoholic beverage sales to hospitals to employment counseling. Not every government service has its private sector counterpart, but many do.

Furthermore, similar underlying economic, technical, and institutional forces are at work in both government and private organizations. Environmental regulation, shifts in energy prices, and imposition of water quality standards shape water utility productivity. Deregulation of energy prices, imposition of oil embargoes, and environmental regulation affect the productivity of electric power and natural gas utilities. Environmental regulations, shifts in energy prices, and the demand for private automobile transportation dramatically reshaped the mass transit field. And demand for labor and new technology is constantly remaking employment service operations.

Much of the past discussion on calculating government productivity has been entangled in questions of effectiveness and outcome. As long as the discussion is restricted to direct outputs, the solutions are generally as tractable for government services as they are for private sector services.

This is not to say that national labor productivity trends can be computed for every State and local government service. Thorny problems exist in calculating State and local government productivity, just as they do in the private sector. However, it should be possible to compute State and local government labor productivity trends for many services.[12]

Endnotes

[1] *Economic Report of the President*, Washington: U.S. Government Printing Office, 1997, pp. 300-1, 338, and 351.

[2] As of 1995, more people were employed by Federal, State, and local government than in manufacturing. *Employment and Earnings*, Vol 44, No. 2, February, 1997, p. 41.

[3] Some State and local governments measure their productivity, or at least the productivity of parts of their operations. However, national statistics, the focus of this report, are lacking.

[4] National Research Council, *Measurement and Interpretation of Productivity*, Washington: National Academy of Sciences, 1979, pp. 9-10. See also, U.S. Congress, Joint Economic Committee, *Productivity in the Federal Government*, Washington: Government Printing Office, 1979, p. 7; and U.S. General Accounting Office, *The Federal Role in Improving Productivity—Is the National Center for Productivity and Quality of Working Life the Proper Mechanism?* May, 1978, p. 45.

[5] Walter L. Balk, Geert Bouckaert and Kevin M. Bronner, "Notes on the Theory and Practice of Government Productivity Improvement," *Public Productivity and Management Review*, Vol. XIII, no., 2, Winter, 1989, p. 117.

[6] Geert Bouckaert, "Public Productivity in Retrospective," in *Public Productivity Handbook*, edited by Marc Holzer, New York: Marcel Dekker, Inc., 1992, pp. 20-29. See also Darlene Forte, "Measuring Federal Government Productivity," in *Handbook for Productivity Measurement and Improvement*, edited by William F. Christopher and Carl G. Thor, Cambridge, Mass.: Productivity Press, 1993, pp. 7-3.1.

[7] U.S. Bureau of Labor Statistics, *Measuring Productivity in State and Local Government*, Bulletin 2166, Washington: U.S. Government Printing Office, December 1983; and U.S. Bureau of Labor Statistics, *Productivity Measures for Selected Industries and Government Services*, Bulletin 2440, Washington: U.S. Government Printing Office, March, 1994.

[8] Jesse Burkhead and Patrick J. Hennigan, "Productivity Analysis: A Search for Definition and Order," *Public Administration Review*, January/February, 1978, pp. 34-40, and Arie Halachmi and Marc Holzer, "Introduction: Toward Strategic Perspectives on Public Productivity," in *Strategic Issues in Public Sector Productivity*, edited by Marc Holzer and Arie Halachmi, San Francisco: Jossey Bass, 1986, pp. 5-14.

[9] Kent Kunze, Mary Jablonski, and Virginia Klarquist, "BLS Modernizes Industry Labor Productivity Program," *Monthly Labor Review*, July, 1995, pp. 3-12.

[10] Jerome A. Mark, "Progress in Measuring Productivity in Government," *Monthly Labor Review*, December, 1972, pp. 3-6, and Richard Murray, "Measuring Public-Sector Output: The Swedish Report," pp. 518-19, in *Output Measurement in the Service Sectors*, edited by Ziv Griliches, Chicago: The University of Chicago Press, 1992.

[11] Richard Murray, "Measuring Public-Sector Output: The Swedish Report," pp. 531-33, in *Output Measurement in the Service Sectors*, edited by Ziv Griliches, Chicago: The University of Chicago Press, 1992.

[12] Several research groups have conducted studies of government productivity. See Richard Murray, "Measuring Public-Sector Output: The Swedish Report," pp. 517-42, in *Output Measurement in the Service Sectors*, edited by Ziv Griliches, Chicago: The University of Chicago Press, 1992; R. Goudriaan, H. de Groot, and F. van Tulder, "Public Sector Productivity: Recent Empirical Findings and Policy Applications," pp. 193-209, *Proceedings of the 41st Congress of the International Institute of Public Finance*, Detroit: Wayne State University Press, 1987; and Malcolm Levitt and Michael Joyce, "Measuring Output and Productivity in Government," Discussion Paper No. 108, London: National Institute of Economic and Social Research, 1986.

Chapter 2. Methodological Considerations

Underlying the measurement of State and local government productivity is a fundamental issue of methodology on which there is considerable disagreement. Not even the definitions and terminology are consistently applied. This chapter discusses the basic conceptual issues and presents the approach used in this bulletin.

The production framework and process

Government productivity measurement may be approached in one of two ways based on how one measures output. One approach focuses on welfare aspects and considers utility functions, indifference curves, and community satisfaction. The approach used in this bulletin, however, focuses on production possibilities and considers production frontiers and cost functions. This approach assumes that government production decisions can be modeled through a production function framework similar to that used in private sector productivity analysis. It requires the general identification of outputs and inputs but does not require detailed specification of a production function.[1]

The basic conceptual model is the following: Government draws on a series of inputs to undertake a series of activities which result in one or more outputs intended to produce a series of desirable consequences. Inputs consist of labor, capital, and purchased materials and services. Activities are intermediate services or processes. Outputs are the final goods or services produced by the government. Consequences, which are also known as outcomes and impacts, are the intended results of government action.[2] A basic model of the production process is portrayed in chart 2.[3]

In its more sophisticated form, the model includes the citizen, who is a producer as well as a consumer, and environmental and community conditions which affect service production techniques (chart 3). In this model, consumers and the environmental setting are necessary parts of the production process, although their importance will depend on the service. They are likely to be much more important in education and policing than in water supply, although even water supply will be affected by these considerations.

For some government services, such as sanitation, the model can be applied in a relatively straightforward manner. Sanitation organizations use laborers, drivers, trucks, brooms, gas, and uniforms as inputs. The sanitation organizations use these inputs to produce a series of activities such as sweeping streets, emptying litter cans, and picking up residential trash. Output, in this case, might be the trash collected. The consequences should be cleaner streets and neighborhoods and fewer fire and health hazards. The more sophisticated model also includes citizen inputs such as reporting of missed collections to government, separating and preparing trash for recycling and disposal, and carrying trash to the curb for pickup. It also includes environmental realities such as the community's topography, household density, and climatic conditions.

For police services, inputs are patrol officers, police cars, communications equipment, and like items. Activities include recruiting and training police officers, and taking calls from citizens. Outputs might include the amount of patrolling and the number of arrests. The consequences of these actions should be a safer community. The sophisticated model would include citizen behavior, such as reports to the police and neighborhood watch activities.

Chart 2. Basic model of the production process

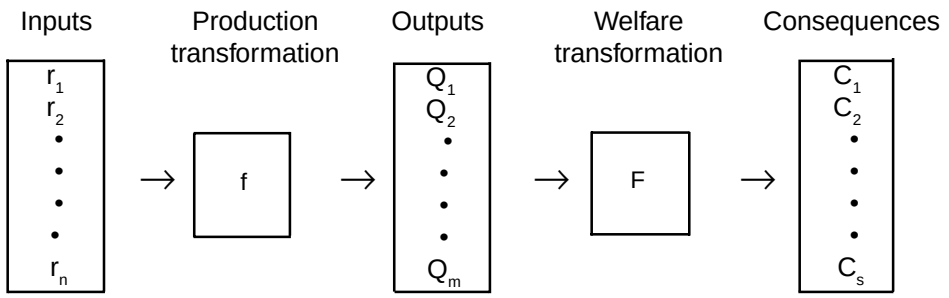
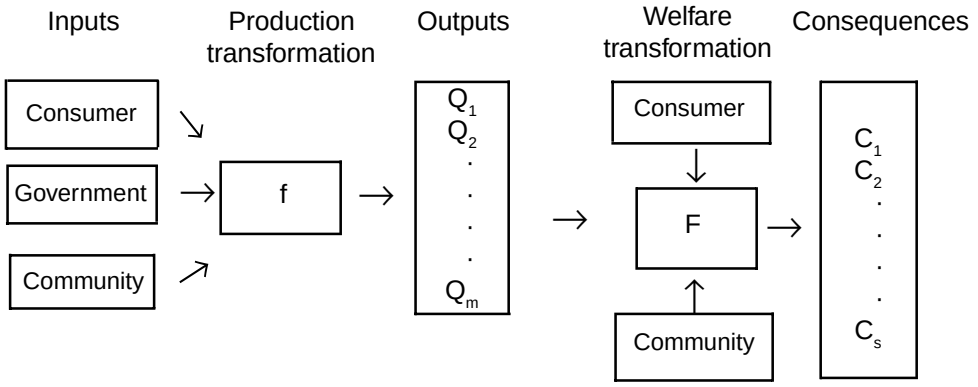


Chart 3. Sophisticated model of the production process



For some services, there is general agreement as to what constitutes an activity, an output, and a consequence, but for many services these are not always obvious (table 6). For police and fire services, the intended consequences and activities are reasonably clear-cut, but the outputs are not. For electric power, the activities and outputs are reasonably clear-cut but the intended consequences are not. Public transit officials, for example, often must provide service to a community and its residents. Their output is the operating transit vehicle; the community's use of the service is a consequence. This concept of transit service differs from the approach of the private sector transit manager, who is free, in most cases, to terminate unprofitable routes. In such cases, capacity provided is an activity while use of that capacity is the output.[4] Although it is not always easy to define outputs—or even to draw the line between a consequence and an output, or between an output and an activity—they must be selected with care, service by service and organization by organization. At the same time, there will often be disagreement on what constitutes a government output and outcome.[5]

The service and the organization level will affect the activity, output, and consequence. The output of one organization may be an activity of another. Water meter repair, for example, would be the output of the water utility repair shop but not of the water utility. The output of a catalog unit of a public library would not be the output of the library. This concern is similar to the intermediate output issue encountered in private organizations. The outputs of an organization's personnel, data processing, budget, and communications units are inputs for other parts of the organization.

This study focuses on final organizational or government output, that is, service provided to the community and its citizens. For the most part, it excludes consequences. The focus is on the rate of change of final government output and the inputs (primarily labor) which are used to produce the output.

Table 6. Examples of steps in the production of selected government services

Service or function	Activity	Output	Consequence
Corrections	Clothe inmates Serve meals Patrol cell blocks	House offenders	Reduce crime Protect society
Education	Conduct classes Give tests Serve meals Operate school buses	Educate students	Increase literacy Reduce unemployment
Fire	Maintain fire trucks Train firefighters	Put out fires Rescue citizens Inspect property for fire hazards	Reduce fire losses Reduce fire deaths
Food stamps	Conduct interviews Conduct audits	Issue stamps	Increase nutritional levels
Library	Shelve books Catalog books	Circulate books	Increase literacy
Street maintenance	Maintain trucks	Repair streets	Reduce traffic deaths Reduce travel time
Water supply	Read meters	Deliver water Repair water mains	Improve community health Generate revenue to support government

Measuring outputs

The specification and measurement of output is the single most troublesome problem in computing productivity. It is a more serious problem for government service than for private sector organizations. Some of the problems are endemic to a specific government activity; others are more general in nature. This section is concerned with the latter. This bulletin addresses the issues of: Specifying the unit of measure, weighting the outputs, accounting for quality change, stipulating the criteria for selecting outputs, and examining the availability of output data.

Unit of measure. The basic output measure(s) of an organization should be a homogeneous physical unit. Furthermore, the measure should be related to the resources spent in its production. Because of the problems in defining and measuring government output, a series of outputs needs to be examined and tested for each government service.

Street cleaning illustrates some of the problems and issues in selecting the appropriate unit of measure. Two commonly used measures of street cleaning output are cubic yards of trash collected and curb miles swept. The curb miles swept will be about proportional to the resources needed for sweeping. Also, the quality of service, such as cleanliness, should be related to the output and input. On the other hand, cubic yards of trash collected will not be as closely related to its resource inputs. In fact, the inverse is likely: As streets are swept more frequently, the cubic yards of trash collected may increase but at a much slower rate than labor inputs. The result is decreasing productivity. Curb miles is the preferred measure of output in this case.[6]

For most public sector output measures, physical quantities are used to calculate the outputs. In the private sector, value data, such as revenue or sales, are usually used.

In such cases, price changes are removed from the value data to obtain an index of real output. Where the industry produces and sells a number of products, this approach facilitates the calculation of output.[7]

The primary problem with using price-adjusted value as the measure of output in the public sector, is that, in most cases, market prices are lacking. Without direct pricing, estimating output in real terms is impossible.[8] Exceptions are the enterprise services, such as water and electric power, which are sold in the marketplace much as services are sold in the private sector.[9] They account for about 6 percent of total State and local government employment. But even for the enterprise services, value is not always a good measure of output because prices are administratively determined and many have little relation to the costs of production. Transit, for example, is heavily subsidized, and the subsidies are adjusted frequently. In such cases, physical measures are preferable.

A second issue in measuring government output is the degree of coverage within each service. Most State and local governments produce multiple services. Some of these are relatively easy to identify. Many sanitation departments, for example, sweep streets, pick up trash, and remove abandoned cars, a set of easily identifiable services. In other cases, the multiple services are not so easily identified. Some electric utilities, for example, conduct energy audits as well as produce and deliver electricity.

There are two basic approaches to the construction of output indexes for multiple-service organizations. One is to identify each organizational product. For sanitation, this might be household trash pickup (measured by tons removed), street sweeping (measured by curb miles swept), and abandoned car removal (measured by the number of cars removed). A separate index could be calculated for each product or service; these, in turn, could be combined into a single sanitation index by using the appropriate weights.

The other approach is to focus on the dominant output. The index for the dominant or primary output would be used to represent the entire function. This approach is valid when secondary outputs are unimportant (at least when the impact on productivity calculation is marginal) or when growth in uncovered output would about parallel the growth in covered output. Kilowatt hours are usually used to measure the output of electric power utilities. Other services such as energy audits and weatherization consume relatively few utility resources.

Whether single or multiple products are used to measure organizational output depends on whether the single product is representative of total output, the importance of the single product and multiple products to decision makers, and data availability.

Another issue is accounting for only that part of the output actually produced during the output cycle (e.g., year). This is not likely to be as significant an issue for State and local government as it is in the private sector where the production of a single item, such as an office building or a ship, may take several years to complete. Most State and local government service outputs are started and completed in the same year. If the product is not completed within the year, or in the accounting period used in the measurement, an estimate must be made of what part of the final output is produced in each year so that outputs and inputs match.

A fourth issue in specifying the unit of output is to include only the work produced by the organization. Many government services are purchased from other governments and private contractors. Many communities contract with private firms to remove household trash, care for juveniles, maintain street lights, and remove snow. Government produced outputs must be separated from contracted outputs. In most cases, the separation is relatively straightforward assuming that data are available. Where a service is provided partly by the government and partly by a private contractor, separation of the output is likely to be more difficult; this mode of operation is becoming increasingly popular.

A parallel issue arises in contracting for intermediate services or activities such as custodial or data processing services. In this case the outputs remain the same, and the inputs reflect the shift from public to private or vice versa. Adjustments for these shifts should be reflected in the inputs as they are in multifactor productivity calculations.

Output weights and aggregation. Calculation of a multiple-service output index or a single service with multiple outputs requires aggregation of individual output measurements. The traditional approach to private sector output calculations is to apply revenue weights to the goods and services sold. For public sector services not sold in the market place, the correct measure would be one that captures the marginal social benefit of each output. Several different approaches have been suggested including cost-effectiveness, cost-benefit, and political voting.[10] Although conceptually attractive they are difficult to develop and are rarely used.

Fortunately, the production function has the cost function as its dual. Thus, it is mathematically correct to use unit costs to weight outputs, and this approach is sometimes used in private sector calculations.[11] It is particularly helpful with government services where price weights are lacking. Another reason for using costs is that they are more fully under the control of the government official, whereas outputs are often under the control of others.[12]

Cost weights or unit costs are available for some government services, but in many instances they are not. In such cases labor weights are often used as surrogates. For most government services, unit labor inputs are a good proxy for unit cost because labor comprises such a large part of government production costs. The weights used to construct the State and local government output indexes presented in this bulletin are unit labor or unit cost weights.

For historical and institutional reasons a 5-year chain-weighted system is used to develop the indexes.[13] The weights are revised periodically, usually every 5 years to take advantage of the Bureau of Census, Census of Governments baseline survey. The general equation used to weight and combine outputs is the following:

$$\text{Output Index} = \frac{\sum L_0 Q_i}{\sum L_0 Q_0}$$

where:

L_o = unit labor requirement in the base year
Q_i and Q_o = output quantities in the current and base years.

Quality of service. Quality change is a major issue in developing output indexes. For many services it is an important, if not crucial, attribute of the output. It is of particular concern in measuring government output. Increases in government expenditures are often justified as quality improvements--streets are kept cleaner, snow is removed faster, and police respond more rapidly to calls for assistance. Conversely, some feel that productivity gains are made at the expense of quality. A study of New York City services published in 1976 concluded that output (quantity) had increased but performance (quality) had deteriorated. In the case of the police department, 36 of 37 measures of output quantity increased, but most measures of quality, such as the proportion of crimes solved, decreased.[14]

There is considerable debate as to what changes in quality mean and how they should be handled analytically.[15] Of the two general approaches, one focuses on consumption, the other on production. For consumption, a quality change is reflected in a change in consumer utility; for production, a quality change is reflected in a change in resource requirements. This bulletin is concerned with the latter.

When production and resource requirements change, adjustments need to be made in the output (or input) index. A dated, but graphic, illustration of such a change is found in the solid waste collection field. Several decades ago many cities shifted from

backdoor to curbside collection. This required citizens to carry their trash to the street, a task formerly performed by government collectors. In fact, what happened was that the government introduced a new service or changed the level of service. The production process was modified and resource requirements were shifted as a result of this change in service.

There are a number of less obvious, but equally important quality changes in government services in recent years. Some changes directly affected the consumer and others affected the population as a whole. An example of the first type is drinking water where major increases in treatment have improved its quality but raised its production cost. Examples of the second type include sewage treatment, solid waste disposal, and electric power generation. In each of these cases, pollution control has raised the cost of production, but resulted in environmental improvements.

Changes in the quantity or volume of production are sometimes viewed as quality shifts. From the standpoint of the citizen, adding a branch library or a recreation center may improve the quality of service because he or she will not have to travel so far to reach a facility. From a production standpoint, it is simply an increase in output, that is, an increase in the quantity or volume of production.

There are several ways to compensate for the change in quality. In the example of the shift from backdoor to curbside trash collection, the input index could be adjusted to include the work of the citizen (labor hours) in transporting the trash from the back door to the curb. The output index would remain the same.

Another approach to a quality shift is to identify the new service and create a new index. In this case, the new service is curbside collection; the old service, backdoor collection. The two productivity indexes would be linked to create a single index.

The result of a change in quality on productivity measurement can vary depending on the output measure chosen. For street cleaning, the more frequently the street is cleaned, the cleaner the streets. If the output measure is curb miles swept, resource requirements will remain about constant, productivity will remain about constant, and the quality of service and output will be about proportional. This assumes that other factors remain fairly constant. However, if the measure is cubic yards of trash collected, more frequent cleaning will result in a decrease in cubic yards collected with each additional cleaning. In other words, resource requirements will increase and productivity will decrease, because of changes in the quality of service.

Clearly, quality should be examined function by function. For some functions, the issues and variables, if not the solutions, are straightforward, while for others they are complex and certainly not obvious.

Identifying the crucial quality considerations in State and local government services is not easy. Although some research and discussion of quality and its measurement have taken place over the past decade, little research has been done on the absolute or relative effect of quality change on productivity, costs, and resource requirements. Lacking systematic research, the process has to be ad hoc.[16]

One approach for handling quality in State and local government productivity measurement is the following:

- Identify service output.
- List quality considerations for the output measure.
- Assess each quality factor for its potential impact on resource requirements.
- Create a quality index time series if the impact is potentially important.
- Track the quality index through time.
- Adjust the input index or link a new productivity index with the old index if the quality index changes.

Criteria for selecting outputs. To guide in the selection of State and local government output measures, seven criteria are presented.[17] The first four are essential; the last three are desirable.

- Outputs must reflect the final product (service) of the organization. To determine pro ductivity, the output must be the product or service leaving the organization, not an intermediate product. Output must reflect the work rather than the consequences or outcomes of the work.
- Outputs must be measurable. Absolute (cardinal) numbers are required. Arguments that government services cannot be measured usually fail to distinguish among the measurement of intermediate products, final outputs, and consequences of government service. Whether or not a service can be measured has to be considered function by function.
- Outputs must be repetitive. Construction of an output index requires a repetitive or recurring set of services or products. The quality of service can change, because it can be adjusted, but the basic service must be repetitive.
- Output data must be accurate and comparable. Much State and local governmentoutput data currently collected, at least at the national level, are incomplete, inaccurate, and inconsistent from period to period. Construction of a viable output index requires reasonably accurate, comparable data. Comparability from one period to the next is more important than absolute accuracy in preparing a time series.
- Output calculations should use existing data and data collection procedures. Two issues are involved here--whether the records exist in State and local government, and whether a procedure currently exists to collect national data. In either case, existing data and data collection procedures should be used whenever possible, as new procedures will likely be costly and time consuming.
- Outputs should be easily understood. An index that is simple and easily understood is most likely to be accepted, supported, and used. Esoteric measures and complex quality adjustments of dubious reliability should be avoided.
- Output units should reflect the resources spent in their production.

Availability of data. Output data, and their availability, play a major role in selecting the services to be measured. It also plays a role in the specific outputs measured. It is a limiting factor for national calculations where output data for even the most straight forward service, such as solid waste management, are lacking. Data are more readily available at the State and local level. Many governments routinely prepare statistical tabulations and performance reports from which output indexes can be constructed. However, even for the individual government, output data are often lacking.

Measuring inputs

This section discusses the number and type of factor inputs used to measure productivity. It also presents the labor measures most often used and reviews some of the questions surrounding these measures. It presents the criteria to be used to select inputs, and discusses data currently collected that might be used to calculate national labor indexes for State and local government.

Number and type of inputs. The number and type of inputs is often used to characterize productivity measures. A common characterization is single factor and multifactor.[18] In reality, there is a continuum of inputs or factors. The number and type of resource inputs used should reflect the use to which the measure is put.

A single factor productivity measure, the most common type, relates one resource, most often labor, to output. It does not measure, however, the specific contribution of the factor to output. Rather, it expresses the joint effect of interrelated influences, such as management, technology, and regulation, as well as changes in other inputs relative

to the measured input, on overall output.

Multifactor productivity relates two or more inputs to output and also reflects the joint effect of many influences. However, it eliminates the effect of the substitution of one factor for another on overall production. Examples of multifactor inputs are labor and capital; labor, capital, and energy; or labor, capital, energy, and materials.

This bulletin focuses on single factor productivity, specifically labor productivity, for several reasons. First, labor is of primary importance in public policy issues. Labor compensation constitutes about 40 percent of all State and local government expenditures (capital and operating), but about 60 percent of all operating expenditures. Its importance varies by type of service (table 7). For example, compensation constituted 90 percent of the expenditures for police programs but 9 percent for State alcoholic beverage sales in 1992. Second, labor is relatively easy to calculate when compared to other factors of production. Third, labor data have been collected for many years and generally are the most accessible of State and local government factor inputs. Fourth, labor indexes are calculated for many parts of the private sector and for some foreign countries. State and local government labor-based indexes permit comparisons with these other sectors and institutions.

Two labor measures that are commonly used to measure private sector productivity are the number of hours and the number of persons. These two measures impart very different information and for this reason both are calculated. The preferred measure is the number of hours because this measure reflects the time worked to produce the outputs.

Hours are the preferred measure for government too, but governmental units do not usually collect these data. Instead, most governments collect and use the number of full-time-equivalent employees.

Full-time-equivalent employees. A full-time-equivalent employee, or an employee year, usually equals 2,080 hours (40 hours per week times 52 weeks per year) and includes all paid time such as overtime, vacation, holidays, and sick leave. Part-time employment is usually converted to a full-time-equivalent basis, such as the number of part-time employees whose hours add up to 2,080 equals one full-time-equivalent employee. Seasonal employment is computed in the same way. Overtime should be handled in the same manner but frequently is simply ignored.

Many practical problems arise in measuring the paid time of State and local government workers. Should standby time of police, fire, and public works officials who are home, but subject to call, be included? Sometimes employees are paid for standby time but more often they are not. What about employees who are paid by the task, such as collecting trash on a specified route? When they finish the task they are permitted to go home. Regardless of the actual time worked, the employees are paid for a fixed, previously agreed upon time.The converse--time worked but not paid--also needs to be considered. Many employees, including managers, teachers, and coaches, work hours for which they are not paid. Conceptually, this time should be counted too, for if it is increasing (or decreasing), productivity trends will be overstated (or understated) if not included. Most of these issues relate to a specific government function or service and should be addressed in that context.

Number of employees. This index simply counts the number of employees who produced the output without regard for the time each employee worked. A part-time employee is counted the same as a full-time employee. An index of the number of employees understates the change in labor input when the time worked per person increases, such as overtime, and overstates the change in labor input when the time worked per person decreases. The greatest divergence between an FTE index and an employee index probably occurs when part-time employment increases or decreases.

Most State and local governments use part-time employees extensively. In October 1992, they employed 12.0 million full-time and about 3.7 million part-time workers (24 percent of the total). However, part-time employment varies substantially by service.

Table 7. State and local government labor compensation as a percent of total operating expenditures for selected functions, fiscal year 1992

Function	Percent
All functions	58.5
Police	90.4
Fire	89.5
Education	82.8
Corrections	76.5
Libraries	66.0
Hospitals	65.9
Finance administration	62.2
Highways	61.3
Transit	60.6
Natural resources	58.0
Parks and recreation	54.3
Water transport	45.9
Health	42.1
Air transportation	41.0
Water supply	39.1
Sewerage	38.6
Solid waste management	34.5
Housing and community development	26.9
Electric power	17.6
Gas	14.3
Welfare	11.6
Liquor sales	8.8

SOURCE: Computed from data taken from Bureau of Census *Government Finances: 1991-92*; *Public Employment: 1992*; and unpublished data from Bureau of Economic Analysis.

In 1992, 4 percent of natural gas utility employees worked part time, in corrections it was also 4 percent, and it was 6 percent in sewerage. But the work forces of local libraries and higher education consisted of 47 percent and 52 percent, respectively, of part-time workers.[19]

Seasonal employment such as for snow removal, leaf pickup, park maintenance, and swimming pool operation can create measurement problems when calculating an index of the number of employees. The primary problem is the period of coverage. Employee counts are commonly published for one date such as December 31 each year, but an employee count on July 30 or October 30 may be quite different because of seasonal variations. To overcome the problem of seasonal employment, the preferred approach is to use a weekly or monthly average of the number of employees to calculate the index.

Comparison of the two approaches. The FTE employee and total employment labor indexes could produce very different trends and movements depending on the period examined. For this reason, it is preferable to calculate both indexes but this is not always possible because of the lack of data.

Whether the two approaches to State and local government labor measurement would produce markedly different labor trends in the public sector is not known. Private sector labor trends for hours and employees differ, but only slightly over the long run. Several government services, as noted above, employ a large number of part-time workers, and could produce very different employee counts as a result. Whether these would

affect labor trends is another question. As long as the ratio between the number of full-time and part-time employees remains constant, the trends of the two series are not affected.

The two indexes did not vary greatly for the services examined, that is, when both could be calculated. But only a few services were examined and for most of these there was data to compute only one type of index. Furthermore, services employing large numbers of part-time workers such as higher education, recreation, or fire fighting were not examined.

Volunteers. Most governments use volunteers, although the extent of use varies considerably.[20] They are common in services such as fire, education, hospitals, museums, and recreation but are relatively rare in others such as public utilities.

Conceptually, a labor index should include volunteer participation. These workers contribute to output just as do paid employees. However, in the real world of data collection and measurement, identifying volunteer labor input or output is extremely difficult. Probably in no more than four or five State and local government services are volunteers even potentially important. If the ratio between paid and volunteer labor remains constant in these areas, their inclusion or exclusion will not affect labor trends. Further, records on volunteers are almost nonexistent in State and local government. Productivity calculations usually include the output generated by volunteers but not their inputs.

Construction employees. Force account,[21] or construction employees, are used in the production of a limited number of government services, primarily in the public works area. Because of the focus on recurring service products and the resources used to produce these services, only those force account employees are included who perform routine maintenance and repair. This requires separating force account employees into two groups: those who are involved in new construction and those who perform routine maintenance and repair. In the case of water supply, only those workers are included who clean existing mains and repair water main breaks. Those who extend water mains to new subdivisions are not included.

For the most part, national government employment data sets do not separate force account workers by the task performed. Thus, it is impossible to identify force account workers, much less to separate them between new construction and maintenance. An exception is the mass transit data collected by the U.S. Department of Transportation as discussed in chapter 3. Fortunately, force account employees are not an issue for most government services, and for those using force account employees, new construction is normally contracted. However, there will be some services, in particular utilities, where force account labor is included in employee counts and it is impossible to identify it. If the ratio remains the same between the force account and other employees their inclusion, however, will not effect the labor trends index.

Changes in work force composition. Labor is often treated as a homogeneous input in productivity calculations although clearly it is not. Depending on the mix, labor inputs can produce very different levels of output. If the mix changes, the level of output can be affected. For example, police departments increasingly require new recruits to have some college education. The rationale behind the requirement is the creation of a police force that can better deal with the public and with today's complex society.

In theory, an increase in police education will increase police output or the quality of output, that is, an improvement in the quantity and/or quality of police output. However, an increase in output resulting from additional education is not an increase in productivity but an improvement in labor input, i.e., a shift in the composition of the labor input.

The method generally used to adjust for changes in labor force composition is pay differentiated by skill mix (e.g., education and experience). This requires information on the change in pay by skill through time, data that are not readily available from State

and local governments. Although often discussed in private sector productivity measurement, changes in labor force composition for State and local government are of secondary concern at this time and are not considered further in this bulletin.[22]

Criteria for selecting inputs. Five criteria are suggested for identifying input data, specifically labor inputs. Those essential for productivity measurement are presented first, those less so follow.

- Inputs must match output. Calculation of productivity requires that the resources applied match the measured organizational output. For organizations with multiple multiple outputs, like the typical city government, this requires careful identification of resources used to produce the outputs.

- Inputs must be measurable. Absolute numbers are required.

- Inputs must be accurate and comparable. Much of the labor data collected on State and local government operations is inaccurate and inconsistent from period to period. Comparability is more important than absolute accuracy. Data analysis should be part of the construction of any index.

- Input calculations should use existing data. New data collection procedures will likely be time consuming and costly to develop and maintain, and burdensome for those providing the data. Existing data and collection procedures should be used whenever possible.

- Inputs should be easily understood. General acceptance, support, and use of an index are more likely if the construction is straightforward and easily understood. This is one reason that labor indexes are widely used.

Availability and accuracy of labor statistics. Most State and local governments collect labor statistics for use in their day-to-day operations. Two types of labor measures, the number of full-time-equivalent employees and the number of employees, are often collected. Most State and local governments should be able to prepare labor indexes by function and for the government as a whole.

Preparation of national or regional labor indexes is not as straightforward. Some labor data are collected and published by function by trade associations, public interest groups, and Federal agencies. The International City County Management Association, the American Public Works Association, the American Water Works Association, and others routinely collect statistics on public employment for specific functions and sometimes for government as a whole. Federal agencies such as the Department of Labor, the Department of Justice, and the Department of Transportation sometimes collect data on the number of State and local government employees for the programs they fund and coordinate.

In addition, there are four sources of national State and local government employment statistics: The Census of Governments; the Current Population Survey (CPS); the Current Employment Statistics survey (CES-790); and the Unemployment Insurance reports (ES 202). The characteristics of these surveys are briefly discussed in the following paragraphs.

Census of Governments, the best known, and probably the most widely used national statistics on State and local government employment, is produced by the U.S. Bureau of the Census. Sample data are collected and published annually. Every 5 years (years ending in 2 and 7), the Census Bureau takes a complete enumeration and publishes the results. Statistics are collected and published on the number of employees (full time and part time) and the number of full-time-equivalent employees. Also, the Census of Governments' employment series includes data on salaries and wages.

There are several problems and potential problems in using these employment statistics to calculate government productivity. First, the statistics are for a single month, October, of each year. Second, the information is not available until months, and sometimes years after the reference date. Third, the functional classification system used by Census is very broad, e.g., police, fire, and employment security. Fourth, each government defines who is to be covered under a function in its own way and this definition often differs from government to government. Furthermore, the definition can change over time.

The *Current Population Survey (CPS)* collects data primarily to calculate monthly employment and unemployment statistics. A number of other statistics, such as hours worked and pay, are collected too. The strengths of this survey for productivity measurement are its timeliness and the information on hours worked. However, the CPS presents a number of problems for State and local government productivity measurement. First, it contains no information on services or functions. Second, it is impossible to separate the employment data by type of government. And third, the employment counts for State and local government as taken from the CPS are markedly different from those obtained from other sources. In short, the CPS is not suitable for State and local government productivity studies.

The *Current Employment Statistics survey (CES 790)* collects data monthly from establishments in nonagricultural industries and government on the number of employees, average hours worked, and average hourly and weekly earnings. About half of all State and local government employment is covered. Employment statistics are broken down into eight functional areas for State government and into seven areas for local government. The advantage of the CES 790 data for productivity measurement is its timeliness; preliminary data are published about 3 weeks after reporting. However, the CES survey has two deficiencies. First, statistics are not available for many government functions. Second, and most important, coding of the data by government function is poor, albeit improving.

Unemployment insurance has covered all State and local government employees since 1978. As a result, State and local governments record monthly employment and wages and report the data quarterly to the U.S. Unemployment Insurance program (ES-202). Because the ES 202 is linked to financial reports, it provides the most accurate statistics available on the number of persons employed by State and local government, by State, county, and metropolitan statistical area.

Although the ES 202 reports are comprehensive, they lack detail and provide inadequate division by function--most employees are assigned to the general government category. The attraction of the ES 202 report lies not in its current form but in its potential if the coding by function were improved.

Conclusion. Four observations are drawn from this examination concerning the measurement of government labor inputs for productivity calculations. First, no single data source is likely to be entirely acceptable. Second, major errors are likely in each data series. Third, viable labor-based input indexes require detailed data comparison and adjustment irrespective of which data set is used. Finally, the best labor data sources for productivity calculations are the special surveys that collect output and input data in the same instrument.

Other issues

This section discusses issues of productivity comparisons, frequency of measurement, geographic coverage, period coverage, and service definitions, which were only briefly noted in the preceding sections.

Productivity comparisons—levels and trends. Underlying all productivity measurement is comparison: through time, of producing units, and of producing units through time. Most private sector productivity measurements are time comparisons, such as, "Productivity increased by x percent between 1973 and 1995." Trends are routinely computed for industries, for individual countries, and for groups of countries.

Similarly, State and local government productivity trends might be calculated and stated as, "Municipal electric power productivity increased by x percent between 1987-92." Productivity trends could also be computed, for example, for mass transit in New York City between 1967 and 1992, or for the Unemployment Insurance program in the Southern States between 1964 and 1992.

Some productivity measures focus on absolute levels: "Each employee produces, on average, x tons of steel or y cars per year." Local government measures might be, "x tons of trash collected per employee" or "y miles of street swept per employee." Comparisons of levels could be made between jurisdictions or regions, or with the Nation as a whole.

Trends and levels complement each other, thus a true picture of productivity requires examination of both. A city service might have a low level of productivity relative to other operations, but a high rate of productivity change, or vice versa. However, the data and analyses required to compute levels are much more demanding than those required to calculate trends. This bulletin focuses on productivity trends.

Frequency of measurement. National productivity trends are normally calculated annually, although some estimates are produced quarterly. The periodicity of calculation is largely a function of data availability.

Benefits that would accrue from more frequent measurement are not obvious. Furthermore, monthly or quarterly productivity movements might not even be detectable for most State and local government services. In addition, seasonal adjustments would have to be made if quarterly or monthly calculations are to be useful. This requires further knowledge about seasonal fluctuations.

Finally, some State and local government services, such as education, have outputs that require more than one month or one quarter to produce and, thus, to measure. For all the above reasons, the data presented here are annual statistics.

Geographic coverage. For purposes of this bulletin, State and local government includes the 50 States, the District of Columbia, and all cities, counties, special districts, townships, and school districts. These jurisdictions comprised about 85,000 State and local governmental units in 1992.

Geographic data source coverage is not always consistent. Some sources include trust territories as well as the 50 States; others include only the larger jurisdictions. Whether trust territories are included is probably not important because they are such a small part of the total. However, by focusing on the larger jurisdictions, bias may be introduced into productivity calculations.

The size as well as the location of a jurisdiction can affect its productivity. Thus, it is important for national statistics to have complete coverage or, if sample data are used, to have a representative sample. Some government services, such as water, sewerage, electric power, and refuse collection, benefit from economies of scale.[23] Other services, such as police and recreation, evidently do not. Topography and climatic conditions affect garbage collection and street repair. The focus here is on national statistics.

Time period coverage. Two time dimensions need to be considered in calculating productivity, the number of periods to be covered by the index (e.g., weeks, months, or years) and the length of the time period (e.g., 12 months or 52 weeks for each year). The time period covered by a productivity index, and the beginning and ending period, can have a marked effect on the overall rate of change. Generally, the longer the time span, the less important the beginning and ending years. Also, a longer period is usually more representative of long-term trends.

Cyclical fluctuations can affect productivity trends. Such fluctuations occur most often when inputs lag the change in outputs. Unemployment Insurance outputs, for example, parallel the unemployment cycle, and labor inputs usually lag behind changes in outputs, as discussed later in this bulletin. The results are productivity indexes that

shift significantly depending on the years included in the index. To avoid arbitrary cutoff dates, and to reflect long-term trends more accurately, average annual growth rates are usually calculated from output peak to output peak.

Structural shifts in the economy or changes in legislation can also influence calculations of long-term rates of productivity change. State and local government electric power productivity dipped markedly with the increase in energy prices in 1973 just as it did in the private sector. Revisions in State Alcoholic Beverage Control laws have had dramatic effects on State alcoholic beverage store sales and productivity.

The second time-related issue is whether the calendar, or special year, such as fiscal or program, should be used in productivity calculations. Most private sector productivity indexes are based on the calendar year. The recently terminated Federal Government productivity measurement system, however, used the Federal Government's fiscal year of October 1 to September 30.

The question is more complicated in the case of State and local government productivity calculations. For a single government, or a group of governments with the same fiscal year, there should be no problem. Data will cover the same period through time. The Bureau of the Census, for example, asks all State and local governments to use the July 1-June 30 fiscal year in reporting financial data. However, State and local government fiscal years vary. The U.S. Department of Transportation collects data from over 300 transit systems with fiscal years ending on March 31, April 30, June 30, September 30, and December 31. The U.S. Department of Energy electric power data are reported by calendar year and the U.S. Department of Labor collects unemployment insurance statistics from the States by the Federal fiscal year.

The closing month of the "productivity" year is not important for trend determinations, but the same month should be used each year. More importantly, the inputs and outputs should cover the same period.

Service specifications and definitions. Definitions of services vary among governments and through time. Public works, for example, may be specified as a single unit; may be broken into major components such as sanitation, water supply, and street maintenance; or may be divided into subservices such as solid waste residential collection, street sweeping, street flushing, and so forth.

For single measurements or studies, definitions can usually be adjusted to meet analytic needs and data availability. For preparation of a national, aggregate productivity index, a formal classification system is needed.

Most of the summary data in this bulletin are based on the classification system and definitions of the Census of Governments (see appendix A). The Bureau of the Census, State and local governments, and the research community have used this structure for years.

However, even this classification system has several deficiencies for productivity measurement. First, the service categories are very broad. Second, governments differ in the manner in which they structure, and thus report, their operations. For example, the functions assigned to police departments or State alcoholic beverage control agencies vary from jurisdiction to jurisdiction.

The Standard Industrial Classification (SIC) system, in contrast to the Census of Government system, is very detailed. It includes all goods and services produced by private and public establishments. State and local government is a small part of the SIC (appendix A lists State and local government services included). Unfortunately, SIC categories are not widely used in State and local government data collection and analysis.

Both the SIC and Census of Governments classification systems should be helpful in structuring State and local government productivity analysis, collecting data, and making comparisons. However, for some services, such as the Unemployment Insurance and the Employment Service, neither classification scheme is sufficiently detailed, and further specification is necessary.

The productivity index

Productivity indexes assume a variety of forms. The one used here relates an output index to a labor-input index. The type of output index used is a base-period labor-weighted composite index, with weights that change every 5 years. BLS used this form for years in its industry labor productivity measurement program.[24] It was used because of past computations, availability of data with which to make the computations, simplicity of computation, and its potential use in decision-making. The resulting productivity index was developed to estimate the amount of labor required to produce a given volume of goods and services. This index is especially germane for calculating government productivity where an organization must respond to a request for its services, and the interest of the decision maker is the amount of labor needed to respond to the request.

The mathematics of the base-period labor-weighted composite index is simple and straightforward.[25] The output index compares the quantity of services in the current year with the quantity in the reference year (such as 1987). For each year, the quantity of service is an aggregate computed by weighting detailed services with the number of full-time-equivalent employee years expended per unit produced.

The index of productivity may be expressed as follows:

$$P_i = \frac{Q_i}{Q_0} \div \frac{H_i}{H_0}$$

where:

P_i = the index of productivity or output per FTE employee year in year i

Q_i = the output quantity in year i

Q_0 = the output quantity in year 0 (the reference year)

H_i = aggregate FTE employment in year i

H_0 = aggregate FTE employment in year 0

Government organizations that produce a single, uniform output, measure output by counting the number of units produced. Among government organizations producing a number of different services—the more typical case—output is computed with the base-period labor-weighted composite output index. The following form is used:

$$\frac{Q_i}{Q_0} = \sum w_0 \left(\frac{q_i}{q_0} \right)$$

where: $w_0 = \frac{h_o}{H_0}$

q_i = the quantity of an individual service in year i

q_0 = the quantity of an individual service in year 0, and

h_0 = the amount of labor expended in year 0 to produce an individual service.

The output index can also be written in this form:

$$\frac{Q_i}{Q_0} = \frac{\sum l_0 q_i}{\sum l_0 q_0}$$

where l_0 is the unit labor requirement of an individual service in the base period (which is calculated as h_0/q_0).

Notice that the labor input measures, H_0 and H_i, can be expressed as follows:

$$H_0 = \sum l_0 q_0 \quad \text{and} \quad H_i = \sum l_i q_i$$

where l_i is the unit labor requirement of an individual service in year i. Therefore the productivity index can be written as

$$P_i = \frac{Q_i}{Q_0} \div \frac{H_i}{H_0} = \frac{\sum l_0 q_i}{\sum l_0 q_0} \div \frac{\sum l_i q_i}{\sum l_0 q_0} = \frac{\sum l_0 q_i}{\sum l_i q_i}$$

This expression shows that the productivity index compares the number of FTE employee years that would have been required in the base period in order to yield the services actually produced in year i to the number of FTE employee years actually used in year i.

Endnotes

[1] Reino T. Hjerppe, "The Measurement of Real Output of Public Sector Services," *The Review of Income and Wealth*, June 1980, p. 239.

[2] For further exposition of this model, see: D.F. Bradford, R.A. Malt, and W.E. Oates, "The Rising Cost of Local Public Services: Some Evidence and Reflections," *National Tax Journal*, Vol. XXII, No. 2 (June 1969), pp. 185-202. See also Gordon P. Whitaker and others, *Basic Issues in Police Performance*, Washington: U.S. National Institute of Justice, 1982, pp. 92-123.

[3] Reino T. Hjerppe, "The Measurement of Real Output of Public Sector Services," *The Review of Income and Wealth*, June 1980, p. 240.

[4] Gordon J. Fielding and others, *Development of Performance Indicators for Transit*, Irvine, California: University of California, 1977, and Anthony R. Tomazinis, *Productivity, Efficiency, and Quality in Urban Transportation Systems*. Lexington, Massachusetts: D.C. Heath and Company, 1975.

[5] James Q. Wilson categorizes government organizations according to the difficulty in specifying their outputs and outcomes. For some agencies, both can be specified, for others neither can be enumerated, and for the remaining units one or the other, but not both can be identified. See James Q. Wilson, *Bureaucracy: What Government Agencies Do and Why They Do It*, New York: Basic Books, Inc., 1989, pp. 158-71.

[6] U.S. Bureau of Labor Statistics, *Measuring Productivity in State and Local Government* (U.S. Department of Labor, Bureau of Labor Statistics), Bulletin 2166, December 1983, pp. 52-59.

[7] U.S. Bureau of Labor Statistics, *BLS Handbook of Methods*, Bulletin 2414, Washington: U.S. Government Printing Office, September, 1992, p. 92. (Note: This edition of the *Handbook* has been superseded by Bulletin 2490 but Bulletin 2414 is cited here and elsewhere in this publication because it describes the methods and procedures used to prepare this bulletin.)

[8] John P. Ross and Jesse Burkhead, *Productivity in the Local Government Sector*, Lexington, Massachusetts, Lexington Books, 1974, p. 35.

[9] Government enterprise service outputs are treated as private sector products in the U.S. national income and product accounts.

[10] Richard Murray, "Measuring Public-Sector Output: The Swedish Report," in *Output Measurement in the Service Sectors*, edited by Zvi Griliches, Chicago: The University of Chicago Press, 1992, pp. 523-25.

[11] Robert W. Crandall and Jonathan Galst, "Productivity Growth in the Telephone Industry Since 1984," in *The Service Productivity and Quality Challenge*, edited by Patrick T. Harker, Boston: Kluwer Academic Publishers, 1995, pp. 391-405.

[12] This issue is discussed further in chapter 4. Also, see Peter Schmidt and Ann D. Witte, *An Economic Analysis of Crime and Justice: Theory, Methods, and Applications*, New York: Academic Press, Inc., pp. 263-80.

[13] Comparison of private sector output calculations using a 5-year chain-weighted system and a revenue weighted procedure (Tornqvist indexes) shows little difference in the long-term growth rates for most industries. Kent Kunze, Mary Jablonski and Virginia Klarquist, "BLS Modernizes Industry Labor Productivity Program," *Monthly Labor Review*, July, 1995, pp. 3-12.

[14] David Greytak, Donald Phares, and Elaine Morely, *Municipal Output and Performance in New York City*, Lexington, Massachusetts: Lexington Books, 1976, p. 110.

[15] Franklin M. Fisher and Karl Shell, *The Economic Theory of Price Indices*, New York: Academic Press, 1972. Jack E. Triplett, "Robert Gordon's Approach to Price Measurement," BLS Working Paper 101, Washington: U.S. Bureau of Labor Statistics, April, 1980; and Mark Sherwood, "Difficulties in the Measurement of Service Outputs," *Monthly Labor Review*, March, 1994, pp. 11-19.

[16] A number of private sector productivity studies have used the hedonic methods to identify and correct for changes in the quality of products and services. So far as is known this approach has not been used in the measurement of government services.

[17] For a slightly different list, see Brian Usilaner and Edwin Soniat, "Productivity Measurement," in *Productivity Improvement Handbook*, edited by George Washnis, New York: John Wiley, 1981, p. 95. For a more extensive discussion of criteria to be used in developing performance measurement systems see, Geert Bouckaert, "Measurement and Meaningful Management," *Public Productivity and Management Review*, Vol. XVII, no. 1, Fall 1993, pp. 31-43.

[18] Multifactor productivity is often referred to as total factor productivity. But because a variety of factors are referred to it is more appropriate to use multifactor.

[19] U.S. Bureau of the Census, *Public Employment: 1992*, Series GE/92-1, Washington: Government Printing Office, 1994, p. 5.

[20] Martha A, Shulman, "Alternative Approaches for Delivering Public Services," Urban Data Service Reports, Vol. 14, No. 10, Washington: International City Management Association, October, 1982, pp. 8-9.

[21] These are construction workers employed by an organization *not* primarily engaged in the construction trades.

[22] U.S. Bureau of Labor Statistics, *Labor Composition and U.S. Productivity Growth, 1948-90*, Bulletin 2426, U.S. Department of Labor, December 1993.

[23] William B. Fox, *Size Economies in Local Government Services: A Review*, Washington: U.S. Department of Agriculture, Economics Statistics and Cooperative Service, 1980.

[24] BLS recently switched its industry computations to the Tornqvist index, an index that is more in keeping with current economic theory. See Kent Kunze, Mary Jablonski, and Virginia Klarquist, "BLS Modernizes Industry Labor Productivity Program," *Monthly Labor Review*, July 1995, pp. 3-12.

[25] U.S. Bureau of Labor Statistics, *BLS Handbook of Methods*, Bulletin 2414, U.S. Department of Labor, September, 1992, pp. 89-90 For further discussion of the different types of measures see W.E. Diewert, "The Measurement of Productivity," *Bulletin of Economic Research*, 1992, pp. 163-98. See also S. Grosskopf, "Efficiency and Productivity," chapter 4 in Harold O. Fried, C.A. Knox Lovell, and Shelton S. Schmidt, *The Measurement of Productive Efficiency*, New York: Oxford University Press, 1993, pp. 160-93.

Chapter 3. Enterprise Services

This chapter discusses the measurement of State and local government enterprise services, presenting indexes for five of them: Electric power, natural gas, water supply, mass transit, and alcoholic beverage sales. Enterprise services are distinguished from other State and local government services by their similarity to private sector operations. In most cases their outputs are sold in the private sector, they have a great deal of autonomy in their operations, and their fees and charges cover their operating expenses.

There are a variety of State and local government enterprise services, the precise number depending on how the services are categorized and counted. The National Income and Product Accounts (NIPA) prepared by the U.S. Department of Commerce use the following breakout:[1]

Airport terminals
Electricity supply
Housing and urban renewal
Liquor stores
Natural gas
Miscellaneous commercial activities
Sewerage
Toll highways
Transit
Water supply
Water terminals

Miscellaneous commercial activities include lotteries, off-track betting, parking, and other miscellany.

The level of fees and charges and the percent of operating costs covered by enterprise service sales vary by service. Some, such as electric power and natural gas, are covered entirely by sales. Others, such as mass transit, are heavily subsidized by general taxes.

Each enterprise service is briefly discussed in this chapter. The chapter also looks at potential output measures and data to calculate the output indexes, examines labor input data, and calculates several productivity indexes. The specific approach and time period covered vary by service, depending on data availability. The concluding section summarizes some of the lessons learned in measuring enterprise service productivity.

Electric Power

Electric utilities are a good starting place for a discussion of the measurement of State and local government enterprise service labor productivity. They are easily identified, they have a readily measurable set of outputs, and they report annually to the Federal Government. Furthermore, productivity indexes have long been calculated for private, cooperative, and government electric utilities. Thus, there is a large analytical and institutional base of knowledge on which to build a discussion.[2]

Institutional setting

Electric utilities can be separated into three basic types, based on the type of ownership—private, cooperative, and government. The private or investor-owned utilities account for about three-fourths of all production and sales. The 262 privately-owned utilities sold 76 percent of the Nation's kilowatt hours, served 76 percent of the customers, and owned 75 percent of the Nation's electric plant and equipment capacity in 1992 (table 8).

Table 8. Percent distribution of kilowatt hours sold, customers served, and installed capacity owned by type of utility ownership, 1992

Type of ownership	Kilowatt hour sales	Customers served	Installed capacity (kwh)
Total	100.0	100.0	100.0
Private (investor)	76.4	75.7	75.1
Cooperative (REA)	7.5	10.6	4.4
Government	16.1	13.7	20.5
Federal	1.8	([1])	9.0
State and local	14.3	13.7	11.5

[1] Less than 0.05 percent.

SOURCE: *Public Power*, January/February, 1994, pp. 72-74, and U.S. Energy Information Administration, *Financial Statistics of Major U.S. Publicly Owned Electric Utilities, 1992*, Washington: U.S. Department of Energy, January 1994, p. 3.

The second type consists of the user-owned Rural Electrification Administration (REA) cooperatives, which expanded dramatically into the rural areas in the 1930s under the sponsorship of the Federal Government. The 943 cooperative systems sold about 8 percent of the Nation's electricity, served about 11 percent of its customers, and owned about 4 percent of utility plant and equipment in 1992.

The third type, the government-owned utility, includes two basic types of utilities, Federal and State and local. The Federal Government is primarily a generator and wholesaler of electric power. It sells about 2 percent of the Nation's kilowatt hours to final customers which accounts for less than 1 percent of the final users, but owns about 9 percent of the Nation's installed generating capacity.

State and local electric power systems, sometimes known as "municipal systems," include State, special district, city, and county operations.[3] The 2,017 municipal systems covered by the BLS productivity indexes presented in this bulletin accounted for about 14 percent of the Nation's kilowatt sales, 14 percent of its customers, and 12 percent of electric plant installed capacity in 1992.

Kilowatt hour sales of the major State and local systems in 1992 went to residential users (34 percent), commercial users (25 percent), industrial users (35 percent) and "other" users such as other public power authorities, railroads, and highway and street lighting authorities (6 percent).[4] Generating capacity was divided among coal (32 percent), natural gas (22 percent), hydroelectric (22 percent), nuclear (13 percent), oil (10 percent), and other (1 percent).[5]

The gross revenue of the State and local government systems was $31.0 billion in 1992. Expenditures, including capital investment, were $32.0 billion. Operations accounted for $22.7 billion. Compensation (wages, salaries, and benefits) accounted for about $3.8 billion or 17 percent of total operations. Fuel, materials, supplies, and purchased power accounted for the rest (table 9).

State and local systems are scattered throughout the United States. The District of Columbia and Hawaii are the only jurisdictions which have no State or local government power systems.[6] California led the list with 13,418 full-time-equivalent employees and $3,211 million in revenue.[7]

Kilowatt hour sales to the ultimate customer is the statistic most often used to measure electric utility output. In 1992, State and local systems sold 395,387 million kilowatt hours to ultimate customers. The 10 largest systems accounted for about 30 percent of the kilowatt sales and the 20 largest for about 40 percent. The largest 483 systems sold almost 90 percent of kilowatt sales according to the U.S. Energy Information Administration (EIA).[8]

The discussion and calculations that follow focus on State and local government electric utilities whether they generate, transmit, or distribute power. This follows the Standard Industrial Classification (SIC) system which is used by BLS and most of the

rest of the statistical community. The SIC assigns all "establishments engaged in the generation, transmission and/or distribution of electric energy for sale" to SIC code 4911.[9] The focus is on the 50 States and the District of Columbia; utilities in the trust territories are excluded.

Research and statistics abound on electric utility operations. This stems from the public's past interest in utility regulation and rate setting, the great debates of the 1930s over public vs. private power, the recent interest in the safety of nuclear power, and the effect of acid rain, all issues that lend themselves to economic analysis. Universities, private consulting firms, utilities, and government regulators routinely study the industry.

Table 9. Finances of State and local government electric utilities by type of government, fiscal year 1992
(millions of dollars)

Category	Total	State	County	Municipality	Township	Special District
Revenue	$30,999	$2,258	$132	$18,232	$511	$9,868
Expenditures	31,983	2,532	144	18,023	487	10,797
Capital	3,950	408	27	2,168	11	1,335
Interest on debt	5,293	571	13	1,353	3	3,353
Current operations	22,739	1,552	104	14,502	473	6,108
Compensation	3,800	341	10	2,190	43	1,217
Other	18,939	1,211	94	12,312	430	4,891

NOTE: "Compensation" estimated by multiplying Bureau of Census October pay times 12. Standard benefits were derived for general government and applied to salary and wage estimates to reach total compensation. "Other" is a residual—current operations minus compensation.

SOURCE: U.S. Bureau of the Census, *Government Finances: 1991-92*, Series GF/92-5. U.S. Government Printing Office, Washington, DC (1996) and U.S. Bureau of the Census, *Public Employment: 1992*, Series GE/92-1. U. S. Government Printing Office, Washington, DC (1994).

The EIA, the American Public Power Association (APPA), the Bureau of the Census, investment firms, and individual utilities all publish data on municipal electric power. There are statistics on the number of customers, kilowatt hour sales, revenues, number of generating stations, miles of transmission lines, plant cost, and allowances for depreciation and amortization. Data used to construct the State and local government productivity indexes are reviewed in the following sections.

Outputs

The output measure used most often to assess electric utility output is kilowatt hours sold, and is the measure used in this bulletin. Other measures are the number of customers, kilowatt hours generated, percent of capacity used, generator capacity, dollar sales, and net profit. The relative strengths and weaknesses of the different measures are seldom discussed in the literature.

William Iulo, one of the few researchers who has examined the different measures, offers four reasons for using kilowatt hours:

- The measure is familiar to industry and the public, and has long been used by both.
- Data are readily available. All utilities collect, keep, and report statistics on kilowatt hours sold.
- The kilowatt hour is a standard physical unit which is not affected by price changes.
- Kilowatt hours are a rough indicator of the industry's ability to produce electric energy.

The only argument Iulo offers against the use of the kilowatt hour is that production costs per kilowatt hour are not always similar.[10]

Chapter 2 lists the criteria used in this study to select State and local government output measures. The kilowatt hour satisfies the four essential criteria and three of the four optional criteria. The only one not met is the one noted by Iulo: Kilowatt hours are not always proportional to the cost of producing and delivering the service to the residential, commercial, and industrial consumer.

Production costs vary by class of service. Capital requirements to construct distribution systems for industrial users are normally less than those required to service residential customers per kilowatt hour delivered. Similarly, the labor required to maintain and service industrial and commercial distribution is likely to be less than that required for residential service.

Weighting output. Because production costs vary, differentiating or segmenting output to account for the different classes of service is common practice. BLS' private sector electric power productivity calculations currently use seven basic weighted aggregates—residential, commercial, industrial, public street and highway lighting, other public, railroads and railways, and interdepartmental.[11] In the past, fewer different outputs among the seven have been used, depending on data availability.

The weights, themselves, should reflect the relative unit cost of producing the service as discussed in chapter 2. However, these data are not always available. When they are not, unit labor, unit price, or unit revenue are often used as substitutes. In the case of electric power it is common practice to use unit revenue or average price per kilowatt hour for each class of service (revenue divided by KWH's sold) as the weight. Iulo has shown that there is a good relationship between unit cost and unit revenue for electric utilities, and BLS uses unit revenue as weights in its investor-owned and cooperative utility calculations.[12] This same procedure is used for State and local government electric utility output measurement.[13]

Utility weights for State and local government utilities have been calculated for 1967, 1972, 1977, 1982, and 1987 (table 10). For 1967, the weights were calculated for residential, commercial and industrial, and other. Starting in 1972, additional data made it possible to divide the commercial/industrial field. These are absolute costs. Relative weights were used to compute the index.

Table 10. State and local government electric utility costs per kilowatt hour by class of service, selected years

Class of service	Dollars per kwh				
	1967	1972	1977	1982	1987
Residential	$0.015	$0.016	$0.029	$0.048	$0.059
Commercial/Industrial	.011	—	—	—	—
Commercial	—	.017	.033	.051	.061
Industrial	—	.010	.020	.033	.044
Other	.015	.017	.034	.055	.116

NOTE: The large increase in the 1987 "other" weight reflects a large drop in the sales of kwh in that year. The impact of this change on the overall index is small because "other" accounts for less than 6 percent of total sales. Dash indicates data not computed.

SOURCE: 1987 computed from statistics provided by the American Public Power Association; all other years computed from *Statistics of Publicly Owned Electric Utilities in the United States*, selected issues (U.S. Department of Energy, Energy Information Administration).

Quality of service. The quality of service is not an issue for most electric power productivity researchers. Whether this is due to conceptual difficulties, data problems, a feeling that quality is an unimportant issue, or a combination of factors, is not known. Researchers who have studied the electric power quality issues have singled out the following as important:

- *Reliability*. This factor concerns the number, length, and duration of supply interruptions. Factors such as weather, disaster, lack of equipment, or lack of fuel may cause interruptions. Building redundancy into the system increases reliability.
- *Voltage*. Lack of proper equipment or insufficient generating capacity may cause voltage fluctuations which result in damage or malfunction of user equipment. Installing additional equipment can control voltage fluctuations.
- *Aesthetics*. The aesthetic factor most often discussed is placement of utility lines—above vs. below ground. Placing utilities below ground increases initial costs. Its impact on operating costs is open to debate.

Adjustments for quality have not been attempted for State and local government electric power utility service.

Generation vs. sales. Because State and local government utilities are not a closed system, a problem may arise in calculating their productivity when they generate and sell power to non-State and non-local utilities, or alternatively purchase and distribute power that other utilities generate. North Platte, Nebraska, for example, sold 198.9 million kilowatts in 1992 to ultimate consumers but generated no electricity itself. The New York State Power Authority, on the other hand, generated 28.6 billion kilowatt hours in 1992 but sold only 13.2 billion to ultimate consumers; it sold the remaining kilowatt hours to other utilities, private and government.[14]

There should be no problem in calculating productivity trends so long as the overall ratio between generation and sales to the ultimate consumer remains roughly the same for all State and local government utilities. In the case of State and local government utilities, the ratio was roughly the same in 1992 as it was in 1967. That is, the utilities, as a group, generated about 70 to 75 percent of what they sold to the final consumer. This ratio has fluctuated from year-to-year as new generating capacity came on line or some large unit was taken off line.[15]

Even when the ratio of State and local government generating capacity vis-a-vis sales to ultimate customers shifts (such as in the 1970s when the New York State Power Authority brought major, new generating plants on line), the impact on average labor productivity is limited. This reflects the small role that labor plays in electric power generation. Labor productivity with, and without, the incremental change in employees working in generation seems to have little effect on overall average labor productivity calculations.

Statistics. There are two basic sources of data on kilowatt hours sold to ultimate consumers by State and local government utilities: (1) the individual utilities and (2) the EIA. The EIA collects and publishes summary information annually on all State and local government utilities (2,017 in 1992) and detailed information on the larger ones, i.e., those that sold more than 120,000 megawatt hours of electricity; there were 483 large utilities in 1992). In past years, APPA has collected some output statistics from a sample of its members, but the Association currently relies on EIA for these data.

The EIA statistical reports include, in addition to summary data, details for individual utilities on the number of customers, kilowatt hour sales, revenues, production expenses, assets, liabilities, profit and loss, generating capacity, number of miles of transmission lines, and numerous other statistics. Kilowatt hour sales are divided by class of customer.

The EIA and its predecessor organizations, particularly the Federal Power Commission, have published statistics on publicly-owned utilities since 1946. However, reporting requirements and tabulation procedures were modified a number of times so that year-to-year summary comparisons are difficult, and can be misleading. Consistent data, including summary data, are available since 1985. The post-1985 data are far superior to the pre-1985 data for purposes of current analysis.

Output indexes. In 1992, State and local government utilities sold 395,386 million

kilowatts of power to ultimate customers, the primary consumers being residential and industrial. The breakdown by type of customer was: 34.7 percent residential, 25.7 percent commercial, 33.8 percent industrial, and 5.8 percent other.[16]

Output of State and local government kilowatt sales grew steadily from 1967 to 1992. The average annual rate of growth of weighted output for the entire period was 3.6 percent. In only 2 years out of the 25, was there a drop in the sales to final customers. The fastest growth in output was recorded in the latter part of the 1960s and the early 1970s. Between 1967-72, the average annual rate of growth was 7.0 percent. The oil embargo of 1973, with the ensuing price increases and burgeoning energy conservation programs, resulted in a decided slowdown in growth of kilowatt hour sales of electricity. From 1972-92, the rate of growth has been fairly constant, averaging 2.7 percent annually (table 11).

Table 11. Unweighted and weighted State and local government electric utility output indexes, 1967-92
(1967 = 100)

Year	Unweighted index	Weighted index
1967	100.0	100.0
1968	108.2	108.4
1969	118.7	118.9
1970	128.1	128.5
1971	137.3	137.9
1972	139.9	140.3
1973	143.7	144.1
1974	145.5	145.3
1975	145.7	145.7
1976	154.0	154.1
1977	163.8	164.1
1978	172.2	172.6
1979	181.5	182.0
1980	184.3	184.9
1981	187.3	188.0
1982	181.4	182.2
1983	185.3	186.2
1984	191.1	192.2
1985	196.8	198.1
1986	201.9	203.3
1987	209.3	211.1
1988	219.1	222.3
1989	223.8	226.0
1990	232.0	235.2
1991	236.5	239.8
1992	237.7	239.4
Average annual rate of change:		
1967-92	3.5	3.6
1972-92	2.7	2.7
1977-92	2.5	2.6
1982-92	2.7	2.8
1987-92	2.6	2.6

The data in table 11 reflect kilowatt sales to ultimate customers weighted by revenue weights categorized by class of service. A simple unweighted index of kilowatt sales to ultimate customers was also calculated. Both indexes cover 1967-92.

Comparison of the two indexes through time shows little difference. The average annual rate of growth for the unweighted index, 3.5 percent, contrasts to 3.6 percent for

the weighted index (table 11), This similarity in trends is due to the stability of the customer mix. In 1967, residential service accounted for 37 percent of total sales to final customers; in 1992 the statistic was 35 percent. Later calculations focus on the weighted index because, conceptually, it is the preferred index.

Two basic sources provided the data to construct the two output series. For 1967-85, APPA Directory data were used with adjustments.[17] For 1985-92, EIA data, as tabulated by APPA, were used.[18]

Labor inputs

Two labor measures were used in calculating State and local government labor productivity in chapter 2. They are the number of employees and the number of full-time-equivalent employees. An index of the number of full-time-equivalent employees, as discussed above, should be equivalent to an hours index.

Sources of data. There are five principal sources of employment data on State/local government-owned power systems: (1) The individual public power systems, (2) the American Public Power Association, (3) the Energy Information Administration, (4) the Bureau of Labor Statistics, and (5) the Bureau of the Census. This bulletin uses data from the Bureau of the Census because they are the only source of State/local government-owned power utility data available for the entire period under review.

Although the Bureau of the Census publishes figures on total employment and full-time-equivalent employment, there are several potential problems in using these data to measure electric utility labor productivity. First, Census included only local employees in its electric utility series prior to 1980. Because output statistics start in 1967 and include both State and local kilowatt hours, the labor input series should include both State and local government employment. The 1980 census figures showed 3,000 State power employees; other data suggest that the figure was closer to 4,000. For trend determinations, the relative change is often as important as the absolute change. Examination of the large public power utilities operated by State employees show that they have grown at a much more rapid rate than the local government utilities. To reflect this increase, this bulletin estimates State data using information provided by the three largest State utilities. These utilities accounted for about 95 percent of State electric utility employment in 1980.

A second potential problem is the aggregate nature of the Census statistics. For example, it is not known how many force account (construction) employees are included in the totals. Force account workers should be excluded from the statistics. Also, some cities operate multiple utilities, e.g., gas, water, and sewerage, and shift their employees to the services in which they are needed. How many employees work in these multiple-service areas is also not known. Overhead personnel are a special case for the multiple-service utility. Discussions with utility personnel and Census statisticians suggest that these numbers are relatively small, and rough calculations suggest that they are relatively stable through time and do not affect the labor indexes.

Another potential problem, but probably not for electric power, is that Census employment statistics are collected for only the month of October each year. These statistics do not capture seasonal employment. However, discussions with electric power officials suggest that seasonality does not substantially affect their employment. For trend calculations the October figure is probably sufficiently accurate for electric power employment calculations.

Employment Statistics. There were 85,210 State and local government electric power employees in 1992 according to the Bureau of Census. Most utilities are small and have only a few employees, but others, such as the City of Los Angeles and Salt River, Arizona, have thousands.

Electric power municipal utility employment usually means full-time employment. Approximately 97 percent of State and local government electric power employees were full-time employees in 1967 and 1992. The ratio of full-time to total has remained fairly constant through time. In 1992, there were 83,612 full-time-equivalent employees.[19]

Four employment indexes are shown here for State and local government electric power utility employment (table 12). The first is for total local government electric power employment, the second is for full-time-equivalent local government electric power employment. Both sets of data were taken directly from Census Bureau statistics. The third and fourth indexes are for State and local government employees, and include the adjustment for State employees noted earlier. For 1980-92, the data were

TABLE 12 Four State and local government electric utility labor indexes, 1967-92
(1967 = 100)

Year	Local government		State and local government	
	Total number of employees	FTE employees	Total number of employees	FTE employees
1967	100.0	100.0	100.0	100.0
1968	98.3	98.2	98.3	98.3
1969	94.3	94.7	94.5	94.9
1970	98.3	98.2	98.5	98.4
1971	101.1	101.8	101.3	101.9
1972	100.7	101.8	100.9	101.9
1973	103.7	105.3	103.9	105.5
1974	106.2	107.0	106.5	107.3
1975	105.4	105.3	105.9	105.7
1976	104.3	105.3	105.2	106.1
1977	101.9	101.8	103.3	103.2
1978	106.1	108.8	107.9	110.5
1979	112.1	112.3	113.9	114.1
1980	115.2	112.3	117.1	114.3
1981	118.1	115.8	120.4	118.5
1982	120.4	116.9	122.1	117.7
1983	120.7	117.4	125.4	122.7
1984	123.0	122.6	127.0	128.5
1985	125.2	124.7	130.3	131.8
1986	128.1	129.8	133.6	135.8
1987	129.3	131.1	134.2	137.3
1988	130.7	131.5	135.6	137.7
1989	127.8	129.7	132.7	135.9
1990	131.1	132.6	136.0	138.8
1991	132.9	134.3	137.9	140.6
1992	133.6	135.4	140.6	144.1
Average annual rate of change:				
1967-92	1.2	1.2	1.4	1.5
1967-72	.1	.3	.2	.4
1972-77	.2	.0	.5	.2
1977-82	3.4	2.8	3.4	2.7
1982-87	1.4	2.3	1.9	3.1
1987-92	.6	.6	.9	1.0

SOURCE: Computed from data taken from Bureau of Census, *Public Employment,* annual issues, with adjustments

taken from Census publications; for 1967-80, State employment was estimated and added to local government statistics taken from Census data.

The overall average annual rates of growth for the four indexes are quite similar. The compound rate of growth for 1967-92 for the first two indexes is 1.2 percent. For the third it is 1.4 percent and for the fourth it is 1.5 percent. In each case there has been a steady progression in the growth of labor with a slightly greater increase in the 1978-86 period.

The two FTE indexes seem to grow at a slightly greater rate than the two indexes for the total number of employees. But the difference is small in each case, and the Bureau of Census revised its FTE tabulation procedures in 1985, so any conclusions about these differences should be treated with caution.[20]

Productivity indexes

Two labor productivity indexes are presented in this section. They use the same output index, but different labor indexes. One labor index reflects total State and local government employment and the other, full-time-equivalent employment. Both draw on the data and investigative approaches presented in the preceding discussion and cover 1967-92. There is little difference in the rate of change between the two indexes: the total employment productivity index increased at an average annual rate of 2.2 percent while the FTE index grew at 2.1 percent (table 13).

The rate of change, however, is marked by uneven periods of growth. The early period, 1967-72, was marked by sizable increases. This was followed by more moderate increases. The latter part of the 1970s and the early and mid-1980s were marked by decreasing productivity. Since the latter part of the 1980s, modest productivity growth has returned (table 13).

The large increase in productivity in the early years (1967-72) was driven by large increases in output. From 1972-92, output growth moderated and average labor productivity was affected by changes in labor. Indeed, the modest increases in output between 1972 and 1982 were matched by modest increases in labor input. The increase in output per FTE from 1987-92 was a function of declining, though still positive, rates of growth in labor input or employment.

Government-private comparisons

Comparison of State and local government and private (investor and cooperative) utility labor productivity movements show remarkably similar trends over the long term. Between 1967 and 1992, the average annual rate of increase was 2.1 percent for State and local government and 2.3 percent for the private utilities; for 1967-90 the rates were identical, 2.3 percent (table 14).

These indexes diverge at several points during the period, however. In the early years, e.g., 1967-72, State and local government productivity index grew at a more rapid rate than did the private index. The opposite was the case in the 1990s with private utilities growing more rapidly. Both indexes reflect declines in average labor productivity in the late 1970s and early 1980s.

Examination of electric power output shows that the private utility kilowatt hour sales to ultimate customers has grown at a slightly greater rate than it has for State and local government utilities. The long-term figures (1967-92) are 4.0 percent and 3.6 percent, respectively. In the 25 measured years, output dropped in 3 years for the private utilities and 2 years for State and local government utilities. Output dipped slightly for both in 1982 and 1992, the first, apparently, due to the recession and the second, apparently, due to mild weather.[21]

The labor indexes, FTE in the case of State and local government and hours for private workers, have also increased at a slightly greater rate for private utilities from 1967 to 1992, 1.7 percent versus 1.5 percent for State and local utilities. However, a more interesting divergence is the drop in labor hours for the private utilities from 1986-92 while the state and local government utilities continue to add FTE employees, albeit at a more modest rate than in the past.[22]

Table 13. Indexes for State and local government electric utilities: Output, FTE employee, total employee, output per FTE employee, and output per employee, 1967-92

(1967 = 100)

Year	Output	FTE employee	Total employee	Productivity	
				Output per FTE employee	Output per employee
1967	100.0	100.0	100.0	100.0	100.0
1968	108.4	98.3	98.3	110.3	110.2
1969	118.9	94.9	94.5	125.3	125.9
1970	128.5	98.4	98.5	130.6	130.5
1971	137.9	101.9	101.3	135.3	136.1
1972	140.3	101.9	100.9	137.7	139.1
1973	144.1	105.5	103.9	136.6	138.6
1974	145.3	107.3	106.5	135.4	136.4
1975	145.7	105.7	105.9	137.8	137.6
1976	154.1	106.1	105.2	145.3	146.5
1977	164.1	103.2	103.3	159.0	158.8
1978	172.6	110.5	107.9	156.1	159.9
1979	182.0	114.1	113.9	159.5	159.8
1980	184.9	114.3	117.1	161.7	157.9
1981	188.0	118.5	120.4	158.7	156.1
1982	182.2	117.7	122.1	154.8	149.3
1983	186.2	122.7	125.4	151.8	148.5
1984	192.2	128.5	127.0	149.6	151.3
1985	198.1	131.8	130.3	150.4	152.0
1986	203.3	135.8	133.6	149.7	152.1
1987	211.1	137.3	134.2	153.8	157.3
1988	222.3	137.7	135.6	161.4	164.0
1989	226.0	135.9	132.7	166.2	170.3
1990	235.2	138.8	136.0	169.5	172.9
1991	239.8	140.6	137.9	170.5	173.9
1992	239.4	144.1	140.6	166.2	170.3
Average annual rate of change:					
1967-92	3.6	1.5	1.4	2.1	2.2
1967-72	7.0	.4	.2	6.6	6.8
1972-77	3.2	.2	.5	2.9	2.7
1977-82	2.1	2.7	3.4	-.5	-1.2
1982-87	3.0	3.1	1.9	-.1	1.1
1987-92	2.6	1.0	.9	1.6	1.6

SOURCE: Output, table 11; employees, table 12

Table 14. Comparison of State and local government and investor and cooperative-owned electric utility productivity indexes, 1967-92
(1967 = 100)

Year	State and local government	Investor and cooperative
1967	100.0	100.0
1968	110.3	107.6
1969	125.3	114.0
1970	130.6	118.2
1971	135.3	124.8
1972	137.7	131.5
1973	136.6	135.8
1974	135.4	133.6
1975	137.8	142.4
1976	145.3	146.8
1977	159.0	153.7
1978	156.1	148.6
1979	159.5	146.6
1980	161.7	144.3
1981	158.7	143.1
1982	154.8	137.3
1983	151.8	139.7
1984	149.6	145.1
1985	150.4	143.5
1986	149.7	147.1
1987	153.8	154.3
1988	161.4	161.9
1989	166.2	166.2
1990	169.5	169.9
1991	170.5	175.0
1992	166.2	176.4
Compound rate:		
1967-92	2.1	2.3
1967-72	6.6	5.6
1972-77	2.9	3.2
1977-82	-.5	-2.2
1982-87	-.1	2.4
1987-92	1.6	2.7

SOURCE: State and local government, table 13; Investor and cooperative-owned, table 149, *Productivity Measures for Selected Industries and Government Services*, (Bureau of Labor Statistics, Bulletin 2440, 1994), p. 81.

Natural Gas

Natural gas utilities, like electric power, are operated primarily by the private sector, produce a measurable set of outputs, and report frequently on their operations. Furthermore, private natural gas utility operations are often measured and labor productivity indexes routinely calculated. However, unlike electric power, natural gas local government productivity indexes have not been calculated.

Institutional setting

Private investor-owned companies dominate natural gas sales in the United States. Almost 94 percent of the sales to final customers are by private, for-profit companies and 93 percent of all gas employees are private sector employees.[23]

There are approximately 1,400 local gas distribution companies (LDC) in the United States. These companies purchase gas from pipeline companies and resell it to residen-

tial, commercial, and industrial customers. The U.S. natural gas industry also produces and transmits gas. However, production and transmission are not a concern of this section.

This section focuses on distribution, or sales to the ultimate customers. It excludes production and transmission. This differs from the approach used for electric power utilities which included generation and transmission to the utility as well as distribution to the customer. This distinction follows the nomenclature used in the *Standard Industrial Classification Manual* which assigns natural gas distribution sales to SIC 4924, which includes all "establishments engaged in the distribution of natural gas for sale."[24] Other SIC codes are used for production and transmission.

The natural gas industry served about 55 million customers in 1991. Ninety-two percent were residential and 8 percent were commercial. Industrial and other comprised less than 1 percent. Dollar revenue sales were more evenly divided. Residential made up about 58 percent, commercial 24 percent, industrial 17 percent, and other 1 percent. Total gross revenue was $44.6 billion in 1991.[25]

In local government, there were 948 jurisdictions in 1992 providing natural gas service. The breakdown by type of government was: Municipal 849, county 17, townships 16, and special districts 66.[26]

Local government gas utilities are concentrated in Indiana, Tennessee, and Texas, and account for about 45 percent of all local gas employment. Fourteen States and the District of Columbia report no local government natural gas utility operations.[27]

Gross revenue of local government systems was just over $3 billion in 1992. Expenditures were $3.1 billion, of which operations accounted for 83 percent. Fuel, materials, supplies and purchased gas accounts for most operating expenditures.[28] Labor compensation accounted for only about 14 percent of operating expenditures (table 15).[29]

Table 15. Finances of local government natural gas utilities by type of government, fiscal year 1992
(millions of dollars)

Category	Total	County	Municipality	Township	Special district
Revenue	$3,034	$15	$2,321	$9	$684
Expenditures	3,058	30	2,177	9	839
Capital	432	15	198	—	219
Interest on debt	92	—	71	—	21
Current operations	2,533	14	1,908	9	599
Compensation	364	4	259	1	99
Other	2,169	10	1,649	8	500

NOTE: "Compensation" estimated by multiplying Bureau of Census October pay times 12. Standard benefits were derived for general government and applied to salary and wage estimates to reach total compensation. "Other" is a residual—current operations minus compensation.

SOURCE: U.S. Bureau of the Census, *Government Finances: 1991-92*, Series GF/92-5. U.S. Government Printing Office, Washington, DC (1996) and U.S. Bureau of the Census, *Public Employment: 1992*, Series GE/92-1. U. S. Government Printing Office, Washington, DC (1994).

There are generally reliable statistics on local government gas operations. The EIA, the America Gas Association (AGA), the Bureau of Census, investment firms, and individual gas utilities all publish data on natural gas operations.[30] There are statistics on the number of customers, dollar sales, amount of gas sold, miles of transmission mains, plant cost, allowances for depreciation, return on investment, and number of employees.

Outputs

The two measures that seem to be used most often when discussing and calculating gas utility output are the number of British thermal units(BTU's) sold and the number of cubic feet sold.[31] Other output measures are the number of customers, dollar sales, gas transported, gas produced, and net profit. No discussion was found in the research literature of the relative strengths and weaknesses of the different measures. Nor was there any discussion of which measure was preferred for labor productivity measurement.

Chapter 2 listed the criteria used in this paper to select State and local government output measures. The BTU and cubic foot measures satisfy both the essential and optional criteria. Although both the cubic foot and the BTU are satisfactory measures of utility output, the BTU measure is used in this bulletin. It is also the indicator used in BLS calculations of private sector output measures.

Local government natural gas utilities sold 741 trillion BTU's in 1974, the first year for which data are available. By 1992, sales had dropped to 616 trillion, a decrease of 17 percent. The average annual decrease during this period is 1.0 percent. This drop follows rapidly increasing prices which apparently fostered greater efficiencies and switches to alternative fuels (table 16).

The breakdown of delivery by type of consumer between 1974 and 1992 shows a varied picture. Specifically, residential, industrial, and other deliveries have decreased 6 percent, 40 percent, and 63 percent, respectively, while commercial deliveries have increased by 23 percent. All statistics are for 1974-92.

Table 16. Natural gas delivery by local government utilities by class of service, 1974-92
(trillions of BTU's)

Year	Residential	Commercial	Industrial	Other	Total
1974	300	122	289	30	741
1975	304	127	231	27	689
1976	302	127	204	25	658
1977	301	128	176	25	630
1978	319	131	187	27	664
1979	308	129	236	28	701
1980	293	126	241	26	686
1981	281	128	244	19	672
1982	285	134	224	20	663
1983	271	126	212	25	634
1984	286	141	213	25	665
1985	266	137	182	20	605
1986	264	136	145	16	561
1987	265	138	152	18	573
1988	280	140	168	17	605
1989	282	144	165	17	608
1990	262	138	165	15	580
1991	271	141	168	11	591
1992	283	150	172	11	616

SOURCE: *Gas Facts*, annual issues

Natural gas end users usually pay different unit prices depending on the type of use—i.e., residential, commercial, industrial, or other—and type of service received—i.e., firm or interruptible supply. The price differences usually reflect the differences in

the cost of providing service. Residential customers, for example, are usually widely dispersed, use relatively small amounts of gas, but need peak amounts on extremely cold days. Service to them is more costly per unit than to industrial users who have relatively stable demand and use gas in large quantities.

Weighting output. When production costs vary by type of service it is important to differentiate the types of service for productivity measurement, and weight them accordingly. BLS' private sector natural gas output calculations use four basic weighted aggregates: Residential, commercial, industrial, and other.[32] The same breakdown is used for local government natural gas output measurement. Each output is weighted by its unit price in the base year and the weighted segments are combined to create the overall index.[33]

The weights should reflect the unit cost or relative cost of producing the service as discussed in chapter 2. However, these data are not always available and unit labor, unit price, or unit revenue are used as substitutes. For natural gas, unit revenue or average price per therm for each class of service (revenue divided by therms sold) is used as the weight in the private sector measure, and that procedure is used here. Relative weights are used in the actual calculations.

The costs per therm by class of service for local government natural gas utilities are presented in table 17. These weights were taken from EIA calculations for the private sector because data were not available with which to calculate local government weights. It is not known whether the relative prices charged by local government utilities are the same as those charged by the private utilities, however, it seems likely that the two would move in concert.

The price weights show rapidly increasing unit prices for residential sales. In 1974, the unit price was $1.43 per therm. By 1987, it had reached $5.54. The unit price rose for the other three classes of service over the 1974-82 period but decreased in 1987. According to industry personnel, this is a reflection of the deregulation of natural gas, the subsequent shifting of costs and prices and, in particular, agreement by buyers to have their gas supply temporarily interrupted.

Table 17. Local government natural gas utility costs per therm by class of service, selected years

Class of service	Dollars per therm			
	1974	1977	1982	1987
Residential	$1.43	$2.35	$5.17	$5.54
Commercial	1.07	2.04	4.82	4.77
Industrial	0.67	1.50	3.87	2.94
Other	0.51	1.32	3.48	2.32

NOTE: *Residential*: Service to customers for domestic purposes including single, multifamily, and mobile homes. *Commercial*: Service to customers engaged in wholesale or retail trade. *Industrial*: Service to customers engaged primarily in extraction of raw materials or changing unfinished materials into another form. *Other*: Service to local, State, or Federal Government; excludes enterprise service sales.

Output index. The weighted output index shows an average annual decrease of 0.7 percent between 1974 and 1992 (table 18). The unweighted index, as noted above, shows an average annual decrease of 1.0 percent. Where electric power indexes show no difference in the average annual change between the weighted and unweighted (2.8 percent) indexes for 1974-92, the natural gas weighted output index reflects the shift to

Table 18. Unweighted and weighted local government natural gas output indexes, 1974-92
(1974=100)

Year	Unweighted output index	Weighted output index
1974	100.0	100.0
1975	93.0	96.2
1976	88.8	93.3
1977	85.0	90.8
1978	89.6	95.7
1979	94.6	98.9
1980	92.6	96.3
1981	90.7	94.2
1982	89.5	93.7
1983	85.6	89.4
1984	89.7	94.1
1985	81.6	86.2
1986	75.7	80.9
1987	77.3	82.4
1988	81.6	86.7
1989	82.1	87.4
1990	78.3	82.8
1991	79.8	84.8
1992	83.1	88.7
Average annual rate of change:		
1974-92	-1.0	-0.7
1974-77	-5.3	-3.2
1977-82	1.0	.6
1982-87	-2.9	-2.5
1987-92	1.5	1.5

residential and commercial from industrial and other sales. The weighted output index is used for the calculations presented and discussed later in this chapter.

Labor inputs

There were 10,561 local government natural gas employees in 1992 according to the Bureau of Census. Most local government utilities are small and have only a few employees.

Gas utility employment, like electric power, means full-time employment. Approximately 96 percent of all local government electric power employees were full-time employees in 1992, and the ratio of full-time to total has remained fairly constant through time.

As discussed in chapter 2, a full-time-equivalent employee index is comparable to an hours index. There were 10,392 FTE employees in 1992.[34]

Because most gas employees are full-time employees, and the ratio between full time and part time has remained fairly constant throughout time, the only labor index constructed and presented here is an FTE series. The data to construct this index are Census Bureau data. The index shows an average annual rate of growth from 1974-92 of 0.9 percent (table 19).

Table 19. Indexes of output, FTE employment, and output per FTE for local government natural gas utilities, 1974-92
(1974=100)

Year	Output	FTE employment	Output per FTE
1974	100.0	100.0	100.0
1975	96.2	99.1	97.0
1976	93.3	98.3	95.0
1977	90.8	97.4	93.2
1978	95.7	101.5	94.3
1979	98.9	105.0	94.2
1980	96.3	96.1	100.2
1981	94.2	95.6	98.6
1982	93.7	103.1	90.9
1983	89.4	99.9	89.5
1984	94.1	100.7	93.5
1985	86.2	104.8	82.2
1986	80.9	109.1	74.1
1987	82.4	104.9	78.5
1988	86.7	111.5	77.7
1989	87.4	114.7	76.2
1990	82.8	114.0	72.7
1991	84.8	113.4	74.8
1992	88.7	118.0	75.1
Average annual rates of change:			
1974-92	-0.7	0.9	-1.6
1974-77	-3.2	-.9	-2.3
1977-82	.6	1.1	-.5
1982-87	-2.5	.4	-2.9
1987-92	1.5	2.4	-.9

Productivity indexes

The increasing employment index and decreasing output index results in falling labor productivity. The average annual decrease between 1974-92 is 1.6 percent, and each 5-year period shows decreasing productivity. In 12 of the 18 measured years productivity declined (table 19).

Government-private comparisons

Investor-owned gas utilities also registered decreasing labor productivity over the past two decades (table 20). Between 1974 and 1992, the average annual change for investor utilities was -2.2 percent.[35] For local government, as noted above, it was -1.6 percent. Between 1974 and 1980 there was little change in either index, but, beginning in 1980, both indexes decreased. The average annual change between 1980 and 1992 was -3.3 percent for investor-owned utilities and -2.4 percent for local government-operated systems.

Both investor and government operations are marked by falling output which is apparently the driving force behind the decreasing labor productivity, at least through 1987. The average annual change between 1974 and 1987 in investor output is -2.1 percent, for government it is -0.7 percent. Investor labor hours remained fairly stable over the measured period while local government FTE's, as noted above, increased slightly.

Table 20. Comparison of local government and investor-owned natural gas utility labor productivity indexes, 1974-92
(1974=100)

Year	Index	
	Local government	Investor-owned
1974	100.0	100.0
1975	97.0	99.4
1976	95.0	101.7
1977	93.2	98.1
1978	94.3	99.5
1979	94.2	101.4
1980	100.2	100.1
1981	98.6	96.3
1982	90.9	87.3
1983	89.5	79.7
1984	93.5	82.0
1985	82.2	80.6
1986	74.1	72.7
1987	78.5	70.6
1988	77.7	74.4
1989	76.2	73.0
1990	72.7	66.9
1991	74.8	66.2
1992	75.1	66.9
Average annual rate of change:		
1974-92	-1.6	-2.2
1974-80	0	0
1980-92	-2.4	-3.3
1974-77	-2.3	-.6
1977-82	-.5	-2.3
1982-87	-2.9	-4.1
1987-92	-.9	-1.1

Water Supply

In contrast to electric power and gas utility operations, which are mostly private sector operations, water supply is primarily a government service. Expenditure, employment, and population-served statistics show that about 85 percent of U.S. water utility operations are government operations. Water operations, like electric power and gas, are capital intensive and are supported primarily by fees and charges.

Institutional setting

There are about 57,000 community water systems in the U.S., serving about 240 million people.[36] A community system, according to the U.S. Environmental Protection Agency (EPA) definition, is one that serves 25 or more year-round residents or which has 15 or more connections to permanent residences. Most of the U.S. population, especially the urban population, is served by government-owned and operated community water system utilities. In 1992, there were about 17,800 government systems.

Large utilities provide most of the drinking water in the United States. The largest 1 percent serve 44 percent of the population, the largest 13 percent serve almost 90 percent. At the other end of the scale, 87 percent of the systems serve almost 10 percent of the population.[37] All statistics are for total community water systems, private and government.

The EPA estimated total drinking water operating costs in 1987 at $11.8 billion. Government expenditures were estimated at $9.9 billion (84 percent) and private at $1.8 billion (16 percent). Capital outlays were another $7.1 billion; government utili-

ties spent about $6.0 billion (85 percent) and private $1.1 billion (15 percent).[38]

Gross revenue of State and local government water supply utilities was about $19.1 billion in 1992. Expenditures were $24.7 billion of which capital and interest was $10.9 billion and operations were $13.5 billion. Operating expenditures can be divided between purchased power, supplies, contract services, and the like, which accounted for 61 percent, and compensation (wages, salaries and fringe benefits) which accounted for 39 percent (table 21).

Table 21. Finances of State and local government water supply utilities by type of government, fiscal year 1992
(millions of dollars)

Category	Total	State	County	Municipality	Township	Special District
Revenue	$19,147	$124	$1,424	$12,724	$572	$4,304
Expenditures	24,738	209	2,070	14,661	687	6,751
Capital	7,567	88	794	4,098	184	2,403
Interest on debt	3,290	33	296	1,861	61	1,039
Current operations	13,521	88	980	8,702	442	3,309
Compensation	5,300	37	403	3,497	133	1,230
Other	8,221	51	577	5,205	309	2,079

NOTE: "Compensation" estimated by multiplying Bureau of Census October pay times 12. Standard benefits were derived for general government and applied to salary and wage estimates to reach total compensation. "Other" is a residual—current operations minus compensation.

SOURCE: *1992 Census of Governments—Government Finances 1991-1992* and *Public Employment 1992*

Government-operated water utilities are, for the most part, local government systems. Three States, Massachusetts, Nevada and New Jersey, operate drinking water utilities, but employ fewer than 1,000 persons in total. Personnel and expenditure totals suggest that 99 percent of State and local government water operations are local government operations. Most local employees work for municipalities (72 percent); others work for counties and special districts. There are local and State government employees who work on water planning and environmental issues but they are not considered here.[39]

More than 17,800 local government agencies deliver drinking water. All States have some local government water utilities, and some have many. In 1992, the number of utilities ranged from 4 in Hawaii to 1,044 in Illinois. The States with the largest number of local utilities or agencies are Illinois, Texas, and Pennsylvania. Those with the fewest are Hawaii, Rhode Island, and Delaware.[40]

Some local governments contract with private firms to operate their water utilities. In 1992, 9 percent were contract and 91 percent were government operated. The focus of this analysis is government-operated facilities.

Economies of scale mark water utility operations.[41] One review noted that large-system unit costs were about half those of small systems.[42] However, another study found economies even in small- sized systems.[43]

Economies of scale and the need to improve water treatment are manifested in large capital investments. Local water utilities spent $7.6 billion in 1992 for capital additions which is 31 percent of all expenditures. By comparison, gas and electric utilities spent 14 and 12 percent, respectively, on capital investment.[44]

Labor accounts for about 39 percent of government water utility current operating expenditures as calculated from table 21. However, several special studies have found somewhat higher percents spent on compensation. An EPA study of 12 large water utilities in the 1970s found that labor costs accounted for 42 percent of the utilities' operating costs.[45] In the Cincinnati water system labor accounted for 62 percent of operating costs in 1973.[46] A recent operating budget from the Fairfax County, Virginia

water utility shows wage and benefits to be 52 percent of the total. The percent compensation, of course, is affected by a number of considerations including the age of the facility, degree of automation, the purity of the untreated water, the amount of treatment, and even the accounting procedures used.

The water services covered in this section are those included in SIC 4941:

> Establishments primarily engaged in distributing water for sale for domestic, commercial, and industrial use. Systems distributing water primarily for irrigation service are classified in Industry 4971.[47]

Agencies that monitor water quality, including regulation, research, and planning, are assigned to SIC 9511, and are not included here. This includes most State agencies which plan and monitor drinking water supplies.

Quality concerns

Probably the greatest challenge and change in drinking water utility operations over the past two decades is the increase in treatment and testing. Water utilities, particularly the larger ones, have treated and tested their water for years (the Public Health Service issued recommended standards for many years). However, it was not until the passage of the Federal Safe Drinking Water Act of 1974 that the standards were made mandatory. Amendments to the Act in 1986 further tightened the standards. In 1986, 23 contaminants were identified as potentially harmful, but by 1993 the number had reached 84 and the number is expected to grow.[48] Just because a contaminant has been identified does not mean that the EPA has issued a standard concerning its testing and treatment. But the identification of the contaminant is the first step along the road.

There are often several ways to remove a contaminant, each with its own efficacy and cost. Furthermore, the technology changes constantly and its cost continues to change, hence it is difficult for utilities to estimate the appropriate treatment technology and resulting cost.[49]

All community water systems are required to test their drinking water, and most do. Today, all large utilities, and most small and medium size utilities test and treat their water. Surveys suggest that between 1975 and 1985 the number of community water supply systems (private and government) which treat any part of their water increased from about 60 percent to 97 percent.[50]

Drinking water treatment and testing costs were estimated at $1.5 billion in 1986. EPA estimates that the 1986 revised standards will increase annual treatment and testing (abatement and control) cost to $2.5 billion (in 1986 dollars), a 24-percent increase in utility operating and maintenance cost.[51] Other projections show even larger increases.[52] These statistics do not include the capital cost associated with treating and testing water, which is estimated by EPA to be about $1 billion in 1986.[53] While these cost estimates are surrounded by considerable uncertainty, they do highlight the increased costs associated with meeting the EPA water quality standards.

Outputs

Dozens of measures are used to assess the output of water supply operations.[54] Most focus on water delivery and sales. Some water utilities produce additional services, such as recreation programs at reservoirs and water conservation audits, but these programs are a small part of local government water utility services and expenditures. This section focuses on the supply of drinking water to the community.

Water utility operations are usually divided into four functions or parts—acquisition, treatment, distribution, and overhead. *Acquisition*, normally a small part of the cost of water, includes all operations before treatment, such as withdrawal of water from above or underground rivers, storage, and transportation to the treatment facility. *Treatment* includes any purification and testing of the water before distribution. It is an increasing portion of water utility costs. *Distribution* is delivery of the water to the customer. *Overhead* includes all administrative and customer services required to manage a utility. Overhead and distribution account for the largest portion of the operating expenditures of most utilities.

Our examination focuses on final output: the delivery of water to the public. Individual utility functions or process are not examined. Testing and treatment are considered but in the context of how they affect final output. The cost of delivery varies by type of consumer, and this is considered as well.

Five indicators of water supply output are examined in the following discussion: Revenue gallons sold, gallons produced, connections, population served, and revenue or dollar sales (deflated value). These measures seem to be used most often in measuring gross output. The strengths and weaknesses of each candidate measure are briefly reviewed using the criteria discussed in chapter 2.

Revenue gallons sold. The preferred measure for tracking a water utility's output, at least for the purposes of measuring productivity, is the revenue gallon or the gallons of revenue producing water delivered to the customer. This measure is analogous to kilowatt hours sold, in the case of electric utilities, and British thermal units (Btu) sold, in the case of natural gas utilities. The revenue gallon is the "basis on which utilities obtain their operating revenues and provides the real basis for comparing productivity and costs between systems."[55] This measure is simple, straightforward, repetitive, and measurable.

This section looks at revenue producing water, that is, the actual water sold or delivered to the customer. Water collected, treated and/or pumped, but lost through leaky water mains, open hydrants and evaporation, is not counted. Also, by focusing on sales to the final customer, we remove inter-utility water sales as a potential measurement problem. The magnitude of resales is not known, but focusing on sales to ultimate users minimizes the problem of double counting in a national index.

The primary argument against using revenue gallons as the measure of output is the lack of data. In short, there is no national statistical series of revenue gallons. Indeed, data have not been collected for even a single year. Furthermore, some water systems do not even collect statistics on the quantity of revenue water sold. For example, prior to 1980, New York City, billed by number of meters and, consequently, had no record of the number of gallons sold to its customers. And the water utilities serving areas around Denver, Fresno, Reno, Sacramento, Saint Louis, and Schenectady did not meter most of their residential customers in 1984.[56] Even those cities that have a policy of metering, such as Boston, New Orleans, and Washington, DC, do not meter all their sales.[57] However, most large and medium-size water systems do meter most of their sales. And metering is becoming more prevalent.

To summarize the revenue producing water measure: It is a utility's final output, it is measurable, repetitive, easily understood and a physical measure. The one criterion where this measure falls short is data availability. While most utilities collect these data there is apparently no reliable data source from which to compute a national output index.

Gallons produced. A proxy measure for revenue gallons sold is the number of gallons produced, such as the amount of water treated or pumped. Such indicators are measurable, physical, and available from most utilities. Utilities may calculate these statistics when they lack data on revenue gallons sold.

Nevertheless, there are several arguments against using gallons produced as a measure of output. First, although it is a measure of the work performed, it is not a measure of final output, that is, the number of gallons sold. As noted above, some of the water pumped or treated is never delivered to utilities' customers; it is used to flush streets, fight fires, or is lost through system leakage. Second, this measure means different things to different people (e.g., gallons treated or gallons pumped) and is open to different interpretation by the utilities. It is not easy to calculate a national series when definitions are murky. Third, in the case of treated water, more and more utilities are treating their water, and counting gallons treated may introduce an upward bias in the output index. Fourth, the national statistics that exist in this area are incomplete and/or subject to question.

Connections. The number of connections is simply the number of drinking water hookups. Another way of measuring the number of connections is the number of meters, but as discussed earlier, not every jurisdiction meters all its water.

This measure can be viewed in one of two ways. On the one hand, it is a reflection of the work of a utility, that is, the number of connections installed and serviced, and the number of meters read. The measure captures a part of a water utility's work. In this sense it is a work measure. On the other hand, it can be viewed as a surrogate measure for the revenue water delivered, and it is in this context that the number of connections is examined in this bulletin.

When this measure is used as a proxy measure, an assumption is made that water use per connection remains constant through time, or at least, that the cost of delivering water to each connection remains constant. Some research suggests that this was the case nationally between 1960-85 as water use per capita increased but the number of persons per household decreased. To quote one expert, "it is probably best to conclude that domestic water use per household was essentially the same during 1980 as during 1960."[58]

There are problems with this indicator as a measure of output, however. First, most water utilities serve non-residential as well as residential customers. If a community has a large number of nonresidential users, or if the ratio between the two changes through time, the number of connections may not be a good measure of the water sold. One study estimated that residential units made up 90 percent of the billings of U. S. water systems but accounted for only 60 percent of the water delivered. If the proportion of residential and nonresidential connections, and the use per connection remains constant through time, the measure might be satisfactory for trend determinations. But these ratios are not known.

Although the connection indicator is measurable, repetitive, easily understood, and a physical measure, it does not reflect the final output of water utilities. Also, there is a question of the availability and accuracy of national data required to calculate this measure. In short, it is a poor measure of water utility output.

Population served. As with the number of connections, the population served is a surrogate measure for the number of revenue gallons sold. The basis for this measure is expert opinion and studies suggesting that over the long run there is a good correlation between the water consumed and the number of people served. Population figures are often used to plan future community water needs. Most water utilities keep this statistic or can readily produce it (number of residential connections times average household population or simply a count of a jurisdiction's population). Also, most national surveys of water utilities collect and use these data. This indicator is recommended by some experts because of its availability and accuracy.

Some research suggests that this indicator is not a very good measure of output, particularly over the short run. Variations in temperature and rainfall can dramatically affect water usage. Also, if there is a shift between non-residential and residential water use, then a simple count of the population is likely to be a misleading proxy for revenue producing water.

Although this indicator is measurable, repetitive, physical, accurate, and easily understood it does not reflect unit labor requirements spent in the production of the service. It may be satisfactory for planning but it is not very useful for annual productivity computations.

Revenue or dollar sales (deflated value). Deflated revenue is an indirect way of calculating output. That is, by removing price change one can determine the quantity sold (price x quantity = revenue). The deflated value approach is often used to measure private sector output when revenue and price indexes are available. But the approach is rarely used in the public sector where services are not normally sold, and revenue figures are lacking. However, government enterprise services, such as drinking water, are largely supported through their sales, and in such instances deflated value should be an

adequate measure for calculating output.

To calculate a deflated revenue index requires good revenue statistics and price deflators. Although the basic output measure suggested here for water utilities is total revenue, data are sometimes available by type of sale, such as residential, commercial, industrial, audits, inspections, and hookups. Such detailed output statistics should produce a better measure of output, than a simple total of all revenue, assuming that price deflators are also available by type of sale. That is, if revenue data are available for hookups there needs to be a deflator for hookup charges. Likewise, if revenue sales are divided between residential and non-residential sales then separate deflators are needed for these two types of sale.

The U.S. Bureau of Census has collected local government water utility revenue data for decades. A fairly large sample is collected every year with a complete enumeration every 5 years. The data are used in preparing the national income accounts.

However, there is no national drinking water sales deflator. The only deflator that comes close to meeting the requirement is the BLS CPI sewer-drinking water deflator. But, there are many problems and questions surrounding the use of the CPI as a deflator to compute a water output index. The CPI includes sewer as well as water charges, it is for urban consumers only, and covers private as well as government sales. The primary advantage of the CPI deflator is that it is available for the entire period for which we have revenue statistics.

To summarize, deflated value has a number of distinct strengths as a measure of final output. It reflects final output, is measurable and repetitive, uses existing data, and should be accurate and comparable. However, it is not easily understood, and it is directly affected by the accuracy of the deflators.

Product differentiation. Irrespective of whether the output measure is revenue gallons, connections, or dollar sales, it needs to be differentiated by type of service. This discussion notes that there are several different types of customers for water utility ouput. Research shows that unit costs can vary dramatically by type of customer. For example, the cost of delivering a gallon of water to a residence can be twice that of delivering it to an industrial firm. The cost of maintaining water mains, billing customers, and even treating the water can be substantially higher for the residential customer. Also, the customer mix has undergone substantial shifts over the past several decades. In particular, industry has moved to recycle and reclaim much of the water it uses as water rates have increased, which has reduced its demand for water. These movements should be reflected in the output measure used for productivity calculations.

Five different types of customers or classes of water—residential, commercial, industrial, public and wholesale—are commonly serviced by water utilities. Water rates often reflect this division at the local utility, and several sample surveys have collected this information. However, no national time series is divided by class of service. Data availability dictates the degree to which outputs by class of service can be differentiated.

Quality adjustments. Another factor that needs to be addressed when calculating water supply output is water quality, a subject that has assumed increasing importance in recent years. How quality affects production costs is the focus of this section.

The costs of delivering drinking water can be significantly affected by the amount of testing and treatment, and most jurisdictions do test and treat their water. Furthermore, the amount of testing and treatment has increased dramatically in recent years.

As discussed in chapter 2, there are several ways to handle changes in quality. One approach is to differentiate the service output by its different levels of quality, weight each, and then combine them to reach an overall index. The problem with this approach in the case of drinking water, is that dozens of elements are routinely tested, and when

treatment is required to remove an element, different types of treatment are used. In short, there are hundreds of possible weight combinations, and while it is possible to reduce their number it is still a formidable task to find the required data and combine them into a single index. Clearly, this approach is not feasible for drinking water.

Another approach to quality adjustment, is to adjust the amount of resources (e.g., labor) used to improve quality. In the case of drinking water, the resources used to treat the water might be estimated and then removed. This approach, which would reduce the resources used to produce the water, would not penalize a utility's productivity measure or index for increasing treatment. This general approach is used here but in a slightly different form.

The output index. This section has reviewed the strengths and weaknesses of the five candidate output measures, the desire to differentiate the measure, and the need to adjust for changes in water treatment. Unfortunately, the review does *not* point to an obvious output measure for water utilities. There are a number of issues and concerns, but data availability is the primary problem.

In summary, if the goal is to calculate a water utility output measure, a deflated value must be chosen as the measure of output. It is the only measure for which government water supply data exist for the entire 1967-92 period. It is the approach used here.

The data for the basic calculations are taken from the annual Census of Governments finance series. The Census data series starts in the 1950s, but in keeping with the timing of other State and local government service indexes, the BLS series begins in 1967. Annual financial series data are used for all years except for 1967, 1972, 1977, 1982, and 1987, the Census benchmark years, when the benchmark data are substituted for the annual series data. Census data show that local government water utility revenue has increased from $2.2 billion in 1967 to $19.0 billion in 1992, and that there have been increases every year. Much of the increase in revenue, as we have discussed, is a reflection of unit price increase over the period (table 22).

To remove the price change, the finance series is deflated with the annual CPI-U sewer-drinking water deflator. The CPI is the only series that comes close to meeting the deflator requirements. However, it includes sewer charges as well as water prices, and there is no way to separate the two. It may be that sewer rates have increased at the same rate as water, and if they have, the CPI should be satisfactory to use as the deflator for drinking water utility sales. However, this is not known. Indeed, from what is known, it is likely that sewer charges have risen more rapidly than drinking water charges over the past 20 years. If this is the case, the use of the CPI to deflate water revenue will result in an understatement of the real growth in water output.

There are several other questions concerning the use of the CPI as a local government water utility sales deflator. One, it focuses on urban consumers, and while most water sales are in urban areas some of the largest increases in water prices have originated with the small, rural utilities. These utilities have had to substantially upgrade their plant and equipment over the past decade, and supposedly raise their rates to a greater extent than the cities. If this is the case, use of the CPI will result in an overstatement of the growth of output. Two, the deflator focuses on one type of sale, residential. Commercial, industrial, and wholesale sales are excluded but they are included in the revenue figures. It is not known whether the price increases at the same rate for each type of sale; there are no price deflators for these sales. Three, the CPI reflects private as well as government sales. However, this should not be a problem since most water sales are by government—about 85 percent—and the research shows no statistically significant difference between the costs of government and private production. Four, no adjustments are made in the CPI for changes in water quality. This probably leads to an understatement in the increase in water output.

Table 22. Local government water utility revenue series and indexes, 1967-92

Year	Local government revenue (in thousands of dollars)	CPI deflator 1967=100	Deflated revenue (in thousands of dollars)	Deflated revenue index 1967=100
1967	$2,187	100.0	$2,187	100.0
1968	2,313	104.6	2,212	101.1
1969	2,464	111.6	2,208	101.0
1970	2,687	120.4	2,233	102.1
1971	2,980	133.3	2,235	102.2
1972	3,171	138.2	2,294	104.9
1973	3,463	146.0	2,372	108.5
1974	3,712	154.7	2,399	109.7
1975	4,142	169.8	2,439	111.5
1976	4,463	188.4	2,369	108.3
1977	4,989	208.8	2,390	109.3
1978	5,505	232.3	2,370	108.4
1979	6,242	243.2	2,567	117.4
1980	6,756	259.6	2,602	119.0
1981	7,699	290.5	2,650	121.2
1982	8,451	325.3	2,598	118.8
1983	9,528	352.3	2,705	123.7
1984	10,467	375.4	2,788	127.5
1985	11,947	397.9	3,003	137.3
1986	13,202	418.9	3,151	144.1
1987	14,334	441.4	3,247	148.5
1988	15,243	465.6	3,274	149.7
1989	16,678	494.0	3,376	154.4
1990	17,565	527.0	3,333	152.4
1991	17,920	565.3	3,170	145.0
1992	19,023	603.9	3,150	144.0

NOTE: CPI deflator is BLS' water and sewer deflator for all urban consumers.
SOURCE: Revenue taken from Census of Governments, annual survey

In short, there are many problems and questions surrounding the use of the CPI as a deflator to compute a water output index. The primary advantage of the CPI deflator is that it is available monthly, quarterly, and annually. It reflects, at least in a general way, the change in water prices over the past 25 years. Mindful of its strengths and weaknesses, this bulletin uses it to calculate a water output index.

Water output index calculations show an increase in deflated revenue of 44 percent over the 1967-92 period. The average annual increase is 1.5 percent. However, the periods of growth have not been uniform. There was a sizable spurt during the 1980s, but since 1989 there has been a decrease (table 22).

Output index adjusted for quality. The Consumer Price Index shows that the unit price of drinking water rose about 500 percent between 1967 and 1992 (table 22). Most of the increase, apparently, is due to inflation brought about by increases in the cost of factor inputs, but part is due to other considerations. They include: Quality improvements resulting from increased treatment; attempts to capture the entire cost of production whereas in the past many water utilities have been subsidized by general taxes; and attempts to reduce water consumption by raising the unit price as water consumption increased. Ideally, each factor should be isolated and an assessment made how each affects the growth of output. But by using the CPI deflator, all these factors are removed when in fact it is desirable to remove only the price increase.

In this section an attempt is made to identify that part of the increase due to quality improvements and adjust the output index accordingly. The procedure used is to identify the funds that the utilities spent on water testing and treatment, deflate them, and add them to the deflated output series. In an imperfect sense the resources are captured that have been devoted to improving the quality of the water.

This procedure is dictated largely by data availability. Two primary sources of data are used, the EPA estimates of funds spent on testing and treatment of water, and the BEA deflators for water and sewer pollution abatement. For 1967-72, no adjustments were made because EPA made no estimates. EPA claims that its research suggests that expenditures for treatment increased at about the same rate as did overall expenditures for water utilities during this period. For 1972-92, treatment expenditures were taken from EPA; for 1972-1987 the statistics are estimates, for 1988-92 they are projections.[59] The real increase in testing and treatment came after the passage of the Safe Drinking Water Act of 1976. The deflators were taken from recent estimates by BEA for 1972-92.[60]

The results of these calculations show that the quality adjusted index increased 54 percent while the unadjusted index increased 44 percent. The average annual increase for the index adjusted for quality is 1.7 percent; for the unadjusted index it is 1.5 percent (table 23).

Adjustments for quality and product differentiation. The index was also adjusted to reflect the shifts among the different services or customers. For example, there has been a relative shift from industrial to residential sales as industrial users have reduced their water consumption. To capture this shift, the overall index was divided into the five customer groups previously noted using sample data. Each group was weighted with the appropriate average revenue weights also using sample data and the segments were linked. The base years are 1967, 1970, 1976, and 1984, which reflect data availability.

The results of these calculations show an overall increase of 57 percent versus 54 percent for undifferentiated sales over the 1967-92 period. The average annual increase was 1.8 percent versus 1.7 percent for the quality adjusted index and 1.5 percent for the unadjusted index (table 23).

Comparison with other indexes. Because of the numerous questions surrounding the deflated value index, it was compared with six other indexes. They are: A sample of revenue produced water (or gallons sold) for 1965-81 drawn from American Water Works Association (AWWA) statistics; a sample of the gallons of water pumped for 1965-84 (AWWA) statistics; a sample of revenue (deflated with the CPI water and sewer deflator) for 1965-84 (AWWA) statistics; a sample of the number of connections for 1965-84 (AWWA); public gallons supplied as collected by the U.S. Geological Survey for 1965, 1970, 1975, 1980, 1985, and 1990; and domestic gallons produced as collected by the U.S. Geological Survey for the same 5 years. These six indexes are all undifferentiated and none are adjusted for changes in water quality. Thus, the comparison is with the unadjusted, undifferentiated deflated value index presented earlier (table 23).

The four American Water Works Association samples were constructed from data collected by the Association in 1965, 1970, 1976, 1978, 1981 and 1984. The statistics collected vary by survey, but the data were published by utility. The procedure used to construct the comparison indexes was to include all utilities that employed 250 or more FTE employees in any sample year. This resulted in a sample of 49 utilities including those in most large cities. While the sample is probably not representative of U.S. water utilities, it does include all the large utilities and much of the U.S. population.

Two indexes were constructed from data taken from U.S. Geological Surveys that it conducts every 5 years. One index, public supply, reflects water supplied by public and private water groups. It includes domestic, commercial, industrial, thermoelectric power,

Table 23. Three local government water utility output indexes, 1967-92
(1967=100)

Year	Quantity	Quantity/ quality	Quantity/quality production-differentiation
1967	100.0	100.0	100.0
1968	101.1	101.1	101.6
1969	101.0	101.0	101.9
1970	102.1	102.1	103.5
1971	102.2	102.2	103.7
1972	104.9	104.9	106.6
1973	108.5	108.4	110.3
1974	109.7	109.5	111.6
1975	111.5	111.8	114.1
1976	108.3	109.2	111.5
1977	109.3	111.1	113.5
1978	108.4	110.2	111.8
1979	117.4	120.3	122.1
1980	119.0	121.9	123.8
1981	121.2	124.5	126.5
1982	118.8	123.3	125.4
1983	123.7	128.2	130.5
1984	127.5	131.9	134.4
1985	137.3	141.8	144.4
1986	144.1	148.9	151.7
1987	148.5	153.9	156.7
1988	149.7	154.7	157.6
1989	154.4	159.5	162.5
1990	152.4	158.1	161.0
1991	145.0	151.6	154.5
1992	144.0	154.1	156.9
Average annual rate of change: 1967-92:	1.5	1.7	1.8

NOTE: The first index is deflated value only; the second is deflated value adjusted for quality, but not product differentiation; the third index is deflated value adjusted for changes in quality and product differentiation.

and public water. The other index, domestic supply, is water for household purposes; it is also called residential water and may be drawn from a public supply or may be self-supplied—e.g., private pump. Both series include private as well as government supplies.[61]

Comparison of these six indexes and the deflated value index presented above show that they all increased during the measured period. Because the six comparison indexes and the deflated value indexes did not cover the same time period it was necessary to examine four separate time periods, 1965-70, 1970-76, 1976-81, and 1981-84. These comparisons showed reasonably good matches in all periods except 1965-70.

The USGS indexes are the only two comparison indexes for which data are available for most of the period (table 24). They include data for 1965, 1970, 1975, 1980, 1985, and 1990. Indexes computed from these data show that from 1965-90, the USGS domestic index increased at an average annual rate of 2.0 percent, and the USGS public index increased at a 1.9 percent-rate. The deflated Census revenue index increased at 1.8 percent. However, there was considerable divergence between the USGS indexes and the deflated value index during the individual segments, particularly in the early years.

In summary, although there are questions concerning the Census of Governments' deflated value series, as there are with all the data, the deflated value index generally moves in concert with the other indexes over the long term.

Table 24. Comparison of three water supply output indexes, 1965-90
(1965=100)

Year	Public supply	Domestic supply	Deflated value
1965	100.0	100.0	100.0
1966			102.1
1967			103.0
1968			104.2
1969			104.0
1970	114.2	119.0	105.2
1971			105.3
1972			108.0
1973			111.7
1974			113.0
1975	122.4	124.4	114.9
1976			111.6
1977			112.6
1978			111.6
1979			120.9
1980	143.4	137.0	122.5
1981			124.8
1982			122.4
1983			127.4
1984			131.3
1985	153.9	152.0	141.4
1986			148.4
1987			152.9
1988			154.2
1989			159.0
1990	162.4	158.4	157.0
Average annual rate of change:			
1965-90	2.0	1.9	1.8

SOURCE: Public and domestic supply taken from USGS reports; Puerto Rico and Virgin Islands removed from the totals. Deflated value computed; no adjustments for quality or product

Labor inputs

There were almost 156,000 local government water utility employees in 1992, a 35-percent increase over 1967. Municipalities employ the majority (69 percent) of these workers. The rest work for special districts (21 percent), counties (7 percent), and townships (3 percent).[62]

The average number of full-time-equivalent employees per utility is about 10, however, the numbers range from zero to thousands. Los Angeles had the most with almost 3,400, followed by New York City with 2,900 and Chicago with 2,100.[63] Some of the small utilities use contract or volunteer personnel.

Most (92 percent) water employees are full-time workers. Comparable figures for gas and electric are 96 and 97 percent, respectively. Like gas and electric, the percent of full-time water employees has remained relatively constant over time. In 1967, for example, 93 percent worked full time, in 1977 it was 93 percent, in 1987 it was 94 percent, and in 1992 it was 92 percent.

The number of full-time-equivalent local government employees was almost 147,000 in 1992. This number has increased at about the same rate as total employment. The FTE increase between 1967-92 is 36 percent while the increase in total employment is 34 percent. The average annual increase over this period is the same for both indexes, 1.2 percent.

As discussed in chapter 2, two labor indexes, FTE and total employment, are usually calculated for government productivity measures. Occasionally the two indexes move in different directions as employees work increasing amounts of overtime or part-time employees are substituted for full-time staff. But, in most cases they move in lock-step, as is the case with drinking water (table 25).

Table 25. Total and FTE employment, local government water supply indexes, 1967-92
(1967=100)

Year	Total	FTE employees
1967	100.0	100.0
1968	99.5	99.3
1969	101.2	101.8
1970	103.2	104.0
1971	103.1	103.8
1972	101.9	104.4
1973	106.5	107.8
1974	113.4	112.4
1975	112.4	111.8
1976	110.8	110.6
1977	111.8	112.6
1978	114.5	115.8
1979	113.8	113.3
1980	115.0	115.7
1981	115.5	116.4
1982	117.1	119.6
1983	119.7	121.8
1984	116.4	119.5
1985	120.1	121.3
1986	121.0	124.1
1987	123.6	126.1
1988	125.6	127.5
1989	127.5	129.0
1990	128.7	130.6
1991	131.8	133.4
1992	134.4	136.0
Average annual rate of change:		
1967-92	1.2	1.2

The indexes presented in table 25 were constructed from the annual Bureau of the Census sample of local governments, and were benchmarked to data collected by that agency in its 100 percent sample taken every 5 years. Although the trends computed from the sample and the benchmarked data are similar, the employment levels are consistently higher for the sample. Overall sample results are 3.9 to 8.4 percent higher than the benchmark numbers. It is not known why there is such a consistent bias. Other local government services, such as gas, electric, and alcoholic beverage sales, reveal sample variance from benchmark year to benchmark year, but not the consistent bias found here.

Both the total employment and FTE employment indexes are presented in table 25. Because the two indexes parallel each other, only the FTE is discussed in this section.

Over the period 1967-92, the average annual increase in the FTE index was 1.2 percent; increases occurred in 19 of the 25 years. There has been no drop in employment since 1984.

Productivity indexes

The average annual increase of 1.2 percent for labor and 1.8 percent for output over the 1967-92 period results in an average annual increase in labor productivity of 0.6 percent. However, the overall increase in the productivity index is marked by numerous, minor fluctuations; productivity during the last three years (1989-92) decreased at an average annual rate of 2.9 percent (table 26).

These statistics reflect the differentiated output index adjusted for quality changes and the FTE employment indexes. If the output index is not adjusted for change in quality and product mix there is still a small (0.2 percent) increase. But, there are some fairly large fluctuations, and for almost half the measured years there was a decrease in labor productivity.

Despite the questions surrounding the measurement of water utility outputs, it does appear that there has been a small increase in local government water utility labor productivity over the 1967-92 period.

Table 26. Local government water supply productivity indexes, 1967-92
(1967=100)

Year	Output	Input	Productivity
1967	100.0	100.0	100.0
1968	101.6	99.3	102.3
1969	101.9	101.8	100.1
1970	103.5	104.0	99.5
1971	103.7	103.8	99.9
1972	106.6	104.4	102.1
1973	110.3	107.8	102.3
1974	111.6	112.4	99.3
1975	114.1	111.8	102.0
1976	111.5	110.6	100.8
1977	113.5	112.6	100.8
1978	111.8	115.8	96.6
1979	122.1	113.3	107.8
1980	123.8	115.7	107.0
1981	126.5	116.4	108.6
1982	125.4	119.6	104.8
1983	130.5	121.8	107.2
1984	134.4	119.5	112.4
1985	144.4	121.3	119.0
1986	151.7	124.1	122.2
1987	156.7	126.1	124.2
1988	157.6	127.5	123.6
1989	162.5	129.0	125.9
1990	161.0	130.6	123.3
1991	154.5	133.4	115.8
1992	156.9	136.0	115.4
Average annual rate of change:			
1967-92	1.8	1.2	0.6
1967-89	2.2	1.2	1.1

SOURCE: Tables 23 and 25

Mass Transit

Mass transit is categorized as a utility by the Bureau of Census and as an enterprise service by the Bureau of Economic Analysis. Nevertheless, it differs from electric power, natural gas, and water supply in several important respects:

- It is labor intensive;
- Its fees and charges fail to support the service;
- It is heavily subsidized by Federal, State, and local government.

Institutional setting

State and local government delivered 94 percent of the transit industry's passenger trips, operated 94 percent of its vehicle miles, and owned or leased 86 percent of its vehicles in 1990.[64] Today, mass transit is government transit. However, this has not always been the case.

A dramatic shift has occurred in transit ownership and operation over the past 50 years: State and local government has stepped in to operate failed private systems. By one count, only 36 systems, or about 3 percent of all transit systems in the United States were government owned and operated in 1950. By 1980, 576 systems were government owned and today most medium and large-size systems are public. In 1950, 28 percent of the industry's vehicles were publicly owned or leased; in 1970, the figure was 66 percent and in 1990 it was 86 percent. In 1970, 68 percent of all vehicle miles were public; in 1980 the figure was 93 percent and in 1990, as noted above, it was 94 percent.[65]

Most transit service is government supplied either through direct provision or by contract with private firms. There are a variety of contractual agreements ranging from private operation with government subsidies to total government operation. The indexes presented in this section reflect the service provided by government employees.

State and/or local government transit systems operated in every State in 1992. New York, with about 65,000 State and local government employees and $10.1 billion in expenditures, is the most deeply involved. The large systems are concentrated in urban areas, particularly in the Northeast, and they dominate production. The 5 largest systems accounted for 38 percent of all transit employment in the Nation; the largest 10 account for 46 percent; and the largest 13 account for 50 percent.

In fiscal 1992, State and local transit systems spent approximately $21.9 billion, or almost 2 percent of all State and local government expenditures. However, their capital expenditures accounted for more than 4 percent of all State and local capital expenditures.[66]

Passenger fares covered about 36 percent of all transit operating expenditures in 1992. Transfer payments and gasoline, sales, and property taxes support the other 64 percent. The Federal Government contributed 5 percent of all operating expenditures, and almost 50 percent of all capital expenditures.[67]

The primary factor input into transit operations is labor. According to one set of data, salaries, wages and benefits accounted for about 42 percent of all transit expenditures (capital and current operations), and 61 percent of all current operating expenditures in 1992 (table 27). A different data set, which includes private as well as public systems and captures the wages, salaries and fringe benefits paid to contractor employees, shows that compensation accounts for about 73 percent of all current operating costs.[68]

Public transit consists of a variety of operational modes. There are six basic types of public transport: Bus, heavy rail such as subway, commuter rail, light rail such as streetcar, trolley bus, and demand response. Less common types include: Urban ferry boat, cable car, incline plane, aerial transport, and several other modes. Bus and heavy rail dominate the mass transit industry carrying about 90 percent of all passengers and producing 82 percent of all vehicle revenue miles (table 28).

Table 27. Finances of State and local government mass transit by type of government, fiscal year 1992
(millions of dollars)

Category	Total	States	Counties	Municipalities	Townships	Special Districts
Revenue	$5,742	$1,126	$165	$1,892	$1	$2,559
Expenditures	21,879	4,292	830	5,613	5	11,139
Capital	5,836	1,713	200	990	—	2,933
Interest on debt	968	257	11	230	—	470
Current operations	15,076	2,322	620	4,392	5	7,736
Compensation	9,150	1,131	370	2,886	3	4,760
Other	5,926	1,191	250	1,506	2	2,976

NOTE: "Compensation" estimated by multiplying Bureau of Census October pay times 12. Standard benefits were derived for general government and applied to salary and wage estimates to reach total compensation. "Other" is a residual—current operations minus compensation. Because of rounding, detail may not add to total.

SOURCE: U.S. Bureau of the Census, *Government Finances: 1991-92*, Series GF/92-5. U.S. Government Printing Office, Washington, DC (1996) and U.S. Bureau of the Census, *Public Employment: 1992*, Series GE/92-1. U.S. Government Printing Office, Washington, DC (1994)

Table 28. Transit modes (private and public) ranked by passenger trips, vehicle revenue miles, and operating expense, 1992
(in percent)

Mode	Passenger trips	Vehicle revenue miles	Operating expenses
Total	100.0	100.0	100.0
Motor bus	61.7	61.4	55.7
Heavy rail (subway)	28.7	20.1	22.9
Commuter rail	4.1	7.9	14.0
Light rail (streetcar)	2.4	1.1	2.0
Trolley bus	1.5	.4	.7
Demand response	.6	8.2	3.2
Other	1.0	.9	1.5

SOURCE: Computed from U.S Federal Transit Administration, *National Transit Summaries and Trends*, (from the 1992 database), p. 15; And *1993 Transit Fact Book*, (American Public Transit Association), pp 27-28.

The motor bus, the most important mode in 1992, accounted for 62 percent of all transit passenger trips, 61 percent of the vehicle revenue miles, and 56 percent of all operating expenses (table 28). Over 50,000 urban motor buses operated in the United States in 1992. These vehicles logged over 4.7 billion passenger trips and approximately 1.6 billion vehicle revenue miles. Over half of all passenger trips were logged by the 15 largest bus systems, and about 40 percent of the bus revenue hours and miles.[69]

Heavy rail or subway is the next most important mode of public transit. In 1992, heavy rail accounted for 29 percent of all passenger trips, 20 percent of vehicle revenue miles, and 23 percent of operating expenditures. The 13 heavy rail systems, all publicly owned and operated, logged 2.2 billion passenger trips for an estimated 10.7 billion passenger miles. New York City dominates the heavy rail systems, accounting for over half of all U.S. passenger trips, passenger miles, vehicle revenue miles, and vehicle revenue hours.[70]

The 18 commuter railroads logged about 314 million passenger trips and 7.3 billion passenger miles in 1992. All were government owned or received government subsidies, but most are operated under contract. Amtrak, for example, provided service for Los Angeles and San Diego, and the Baltimore and Ohio provided service to Baltimore and Washington.[71]

Sixteen light rail systems, of which 15 were government, were operated in 1992. This mode shows substantial growth since the early 1970s. In 1992, the 16 light rail operations carried 187 million passengers a total of 700 million passenger miles. The six largest systems accounted for about 75 percent of the passenger trips and passenger miles.[72]

Only five trolley systems operated in 1992, the same number as in 1980. A relatively minor mode in terms of mass transit, it accounted for only 126 million passenger trips and 199 million passenger miles in 1992. The San Francisco system accounts for over half the country's trolley service.[73]

Demand response accounted for 45 million passenger trips and 209 vehicle revenue miles in 1992, much of it operated by small, private firms under contract to government agencies. Formerly known as dial-a-ride, it is a service that has grown dramatically over the past decade. In earlier years it was not even identified as a separate mode, but simply lumped under the general heading of paratransit along with jitneys and airport limousines.[74]

The following discussion focuses on bus and heavy rail operations because of their importance. The tabulations, however, include light rail and trolley operations, but exclude demand response, commuter rail, and the lessor modes of transportation. School buses, which are normally operated by school systems, also are excluded.

This discussion focuses on fixed route systems as defined in the *Standard Industrial Classification Manual* (SIC 4111):

> Establishments primarily engaged in furnishing local and suburban mass passenger transportation over regular routes and on regular schedules, with operations confined principally to a municipality, contiguous municipalities, or a municipality and its suburban areas. Also included in this industry are establishments primarily engaged in furnishing passenger transportation by automobile, bus, or rail to, from or between airports or rail terminals, over regular routes, and those providing bus and rail commuter services.[75]

Extensive data collection and research support transit, probably more than any other government service. The American Public Transit Association (APTA) and the Bureau of Census have collected data on individual transit systems and produced national statistics for many years. The U.S. Department of Transportation also collects very detailed statistics on individual transit systems using comparable definitions and reporting forms. These are known as the National Transit Database. Using them, and other data, the research community has conducted extensive research on the operations of the service including studies of productivity. In addition, there have been demonstration projects and evaluations.

Outputs

Over the past several decades transit output measures have been expanded and massive amounts of data have been collected, edited, and published. There is no lack of measures and measurements of public transit operations today.[76] The output measures that seem to be most often recommended for productivity measurement purposes include: Vehicle revenue hours, vehicle revenue miles, vehicle miles, number of passengers, passenger miles, and passenger revenue.

Private sector analysts often focus on number of passengers, passenger miles, and passenger revenues, while public sector transit analysts and managers use all the measures, but focus on vehicle revenue hours, vehicle revenue miles, and vehicle miles for productivity calculations. The strengths and weaknesses of each of these measures are analyzed at length in the literature. The following discussion briefly reviews this research.

Vehicle revenue hours. Vehicle revenue hours (VRH) seems to be the output measure that most transit managers prefer for productivity analysis. Revenue refers to the hours

a vehicle is in service and capable of generating revenue, not the amount of revenue actually generated. VRH do not include the hours spent traveling to and from storage facilities, other deadhead travel, or layover time. Vehicle revenue hours is a measure of transit availability or capacity. A bus could travel a route for 8 hours without any passengers but still generate 8 revenue hours.

Arguments in favor of this measure are that it is measurable, repetitive, accurate, easily understood, a good measure of the cost of production, and data are readily available with which to calculate this index. It is also a measure over which decision makers have good control, it encourages reduction of nonproductive use of vehicle deadhead and layover time, and it is a good measure of the service provided to a community. If the hours of service are extended, revenue vehicle hours increase. If service is cut, they decrease.

The principal argument against using vehicle revenue hours as an output measure is that it is a measure of capacity, not use. An increase in vehicle revenue hours does not necessarily lead to an increase in the number of passengers carried or revenue collected. It is not a measure of final output, at least in the context in which the term is used here.

Vehicle revenue miles. This is a measure of the miles traveled by vehicles while picking up and transporting passengers. It does not include miles driven to start a route such as deadhead miles. It is analogous to VRH except that it uses miles rather than hours. There should be a very high correlation between the two measures. The arguments for and against using vehicle revenue miles as an output measure are similar to those already discussed under vehicle revenue hours. The primary argument in favor of miles is its availability.

Vehicle miles. This is a measure of the number of miles traveled by transit vehicles. It should correlate highly with vehicle revenue miles and vehicle revenue hours. Both of these measures are more useful for productivity measurement purposes because they exclude non-productive time. Nevertheless, the argument in favor of using vehicle miles instead of revenue vehicle miles is data availability. Most, if not all, transit systems have collected data on vehicle miles for years.

Passenger trips. A measure of transit use, in contrast to capacity provided, is the number of passengers or passenger trips. The basic measure is a count of all passengers using a transit system. The measure is sometimes divided by type of passenger—paying, nonpaying, school child, reduced fare, elderly, and so forth. A special concern is how to count passenger transfers. Some systems count transfers as additional passengers; others do not.

The variation of this measure that is used most frequently today is the unlinked passenger trip (UPT) which is defined as the number of transit vehicle boardings. Each time a person boards a vehicle he or she is counted; each transfer as well as the initial boarding is counted as an unlinked passenger trip.

The basic strength of the unlinked passenger trip measure is its focus on usage. "For the typical transit system, increased patronage from one year to the next is much more significant than any other financial or operating statistic."[77] Most, if not all, transit systems keep statistics on the number of passengers. Also, the measure is a physical count, is easily understood, is measurable, and it is repetitive.

The public transit industry's basic problem with this measure for productivity assessment is that it is an effectiveness or outcome indicator of the service provided, not a measure of final output. This argument applies equally to all consumption-based measures of transit output. Other arguments against this measure are that some transit systems do not accurately measure the number of passengers, and that this measure provides no information about the length of the ride.

Passenger miles. Passenger miles are probably the most widely used physical output measure of private sector passenger transportation productivity. This measure is supe-

rior to a count of the number of passengers because it takes into account the length of the ride which is important if the length of the ride is changing. Passenger miles are normally defined as the number of miles traveled by all paying passengers in a set time period. One passenger traveling one mile is one passenger mile. The private sector studies of Deakin and Seward; Kendrick; Scheppach and Woehlcke; and the U.S. Bureau of Labor Statistics all use passenger miles in one form or another.[78]

The arguments normally advanced against passenger miles as the measure of output generally are the same as those noted in the case of the number of passengers. Probably the most fundamental criticism is data availability and accuracy. A primary problem is estimating how far passengers ride in a fixed-fare system. If the length of the average passenger trip remains constant through time, which is probably a reasonable assumption in the short run, then passenger miles and the number of passengers would result in the same index.

Passenger revenue. This measure is the total revenue collected from passengers. Passenger revenue, sometimes known as "farebox revenue," is available in every system that collects fares, and is available nationally. For those systems that cover costs through fares, it reflects transit usage. Also, it is repetitive and accurate, and it is easily understood.

For several reasons, passenger revenue is not a particularly good measure of output for productivity measurement. First, to calculate an output index would require an accurate set of deflators. Second, passenger revenue comprises less than 40 percent of national transit revenue (subsidies make up the rest), and it has decreased as a percent of total revenue over the years. Hence, even with a good set of deflators, a deflated revenue index would not be a good measure of transit output. Third, nonpaying passengers are often an important user group. Every system has some, and some systems have many. A few systems charge no fares whatsoever. Finally, passenger revenue is a function of administered fares, which may or may not be a function of the cost of providing the service.

Which measure?

If one views transit as an enterprise service, then usage should be the output measure. That is, if it is categorized as a private good like electric power and drinking water, and it supports its operations by fees and charges, then the focus should be on the service consumed.

If, on the other hand, transit is categorized as a general government service, and there are arguments that suggest that this should be the case, then a capacity measure might be preferred. It is clear that the public transit industry prefers this approach.

Rather than wrestle further with the capacity-usage conundrum, this bulletin computes one measure of each. They are complementary measures and provide very different insights into transit output and productivity, and for this reason alone they should both be calculated.

Unlinked passenger trips is the usage measure chosen for examination. Although the concept of passenger miles is preferred conceptually, good data are lacking, particularly in the early years. Even in later years, when passenger mile data are available, there are questions concerning their accuracy. As noted above, passenger mile and passenger trip indexes should track reasonably well in the mass transit environment, at least over the short run.

The chosen capacity measure is vehicle revenue miles. Vehicle revenue hours is the preferred conceptual measure, but data to calculate the measure are more readily available for VRM, particularly in the early years.

Data to calculate each output measure should be categorized by service mode, such as bus or heavy rail, because of different factor inputs. Bus and heavy rail dominate transit service. The indexes prepared as part of this bulletin include four modes—bus, heavy rail, light rail, and trolley. These accounted for more than 80 percent of all transit employment in 1992.[79]

Quality and level of service

The quality and level of service are important considerations in every transit operation. Travel time, reliability, safety, and comfort are all important dimensions of transit output. Chapter 2 suggested that such factors need to be explicitly considered and adjustments made whenever they affected base-year unit labor requirements or cost weights. Such requirements will be affected by three considerations: The relationship of quality and level of service to total labor or cost requirements; the unit output measure; and the magnitude of the change.

Quality and level of service should be taken into account when a change markedly affects labor or cost requirements. This is not to say that the attribute is unimportant when it does not affect these factors, only that it need not be considered in productivity calculations. For example, employee courtesy is an important quality attribute, to which the public and transit authorities, alike are sensitive. To improve employee courtesy, transit managers sponsor "Driver of the Month" awards and courtesy training, and when all else fails they may use disciplinary action. Important as these programs might be to a transit manager, they are relatively unimportant for resource requirements, and need not be considered in transit productivity calculations.

The second factor to be considered is the output measure used to calculate productivity. A change in a quality or level of service attribute can affect unit costs for some measures but not others. For example, frequency of service plays a major role in unit costs. Systems that provide 24-hour service usually have very different unit cost requirements from those that provide only rush hour service. Changing the level of service will likely have a major effect on unit costs for output measures such as passenger miles, but will have little effect on vehicle revenue hour measures.

The third point is that, for trend calculation, adjustments are not needed as long as quality and level of service remain constant or approximately constant. To make such a judgment requires that these attributes be followed through time.

Productivity literature often cites seven quality and level of service attributes: Courtesy, comfort, safety including accidents, security including crime, convenience and accessibility, reliability, and travel time. By calculating possible program changes in each of these areas their impact on unit labor requirements can be estimated. This will also provide information which might usefully be examined and tracked through time.[80] This review suggests that within a reasonable domain, changes in four attributes—courtesy, safety, reliability, and travel time—are not likely to affect unit labor requirements. However, for three—comfort, convenience and accessibility, and security unit labor requirements could be affected.

The quality attributes most susceptible to programmatic changes are:

- Air conditioning of vehicles and stations (comfort);
- The Americans with Disabilities Act (ADA) requirements which include wheelchair lifts on vehicles and station elevators (convenience and accessibility);
- Hours of service (convenience and accessibility);
- Change in the number of transit police (security).

National time series data are generally lacking with which to assess changes in these attributes. But the available statistics suggest that there has been little change in the ratio of transit police to operating personnel from 1967-92, and the hours of operation have not been modified, at least in the large systems. The ADA requirements are likely to have an affect, but through 1992 it has been mostly in capital improvements. Air conditioning has been installed in most transit system vehicles over the past 25 years, which certainly has affected unit cost and labor requirements. However, the degree of impact is not known, and no modification of the data have been attempted to take this into account.

Index construction and data availability

Productivity calculations in this chapter focus on two output measures, the unlinked passenger trip index and the vehicle revenue mile index. For each, separate indexes of bus, heavy rail, light rail, and trolley operations have been calculated. The individual modes were then combined using base period unit labor weights with 1967, 1972, 1977, 1982 and 1987 as the reference years.

The data to calculate the output indexes were taken primarily from the U.S. Department of Transportation National Transit Database for 1979-92, and APTA Transit Operating Reports, individual system annual reports, and special studies for the 1967-79 period. The statistics reflect all heavy rail, light rail, and trolley facilities operated by local government employees in the base year. Bus operations include all local transit systems with 200 or more full-time-equivalent employees. In 1967, only 21 systems were included; in 1987, 70 were included. Not included in these statistics are cable car, commuter rail, demand response, ferry boat, incline plane, and monorail facilities. The 1992 sample covered 83 percent of all local government mass transit employees.[81]

Vehicle revenue mile indexes

The number of local government mass transit vehicle revenue miles increased by more than 75 percent between 1967 and 1990; it has since dropped slightly. The average annual increase in VRM between 1967 and 1992 is 2.2 percent, with VRM increasing in 20 of the 25 measured years. The largest increase came early in the period when there was a rapid shift from private to government operations. Between 1967 and 1977 the average annual increase was 4.2 percent; between 1982 and 1992 it was less than 1 percent per year (table 29).

In the modal series, vehicle revenue miles increased for bus, heavy rail, and light rail while trolley dropped by almost half. The largest percentage increase was in light rail as new systems were built and introduced into operation. The average annual increase in light rail VRM was 5.7 percent. Bus increased at an average annual rate of 2.8 percent and heavy rail increased at 1.2 percent. But from 1982-92 there was virtually no change in bus VRM in the sample, while heavy rail and light rail VRM increased rapidly.

Table 29. Vehicle revenue mile indexes for local government mass transit service by mode, 1967-92
(1967=100)

Year	Total	Bus	Heavy rail	Light rail	Trolley
1967	100.0	100.0	100.0	100.0	100.0
1968	101.7	101.3	102.7	98.9	96.9
1969	104.2	103.0	107.2	97.7	87.8
1970	118.0	120.9	114.7	211.6	87.5
1971	120.8	124.3	116.5	238.5	84.3
1972	122.6	129.6	113.7	238.5	82.3
1973	132.7	151.9	108.8	238.5	65.2
1974	137.2	159.2	110.1	239.7	59.9
1975	144.5	175.0	106.2	231.3	60.4
1976	150.9	188.7	103.1	231.0	58.5
1977	150.5	192.6	96.8	227.3	56.2
1978	150.1	192.7	95.4	242.9	55.7
1979	151.3	193.3	97.6	244.0	55.4
1980	155.6	197.4	102.5	241.2	56.1
1981	160.1	202.9	105.9	259.7	52.2
1982	160.2	203.2	105.6	250.6	55.4
1983	157.3	197.4	106.4	241.2	59.0
1984	160.7	198.4	113.5	246.2	60.3
1985	162.0	197.5	117.8	236.7	61.5
1986	165.5	200.0	123.1	249.4	58.1
1987	166.0	198.6	126.2	269.5	58.9
1988	170.4	201.0	133.2	304.6	57.7
1989	176.6	209.3	137.0	311.9	56.9
1990	177.0	208.7	138.2	354.4	54.1
1991	174.0	204.8	135.7	404.2	53.4
1992	172.1	201.7	135.2	401.0	54.8
Average annual rate of change:					
1967-92	2.2	2.8	1.2	5.7	-2.4

Passenger trip indexes

The increase in unlinked passenger trips (UPT) is much more modest. The average annual increase between 1967 and 1992 for all four modes combined is 0.5 percent. While there has been a steady increase in vehicle revenue miles, the UPT index has generally declined since 1984 (table 30).

The decrease in unlinked passenger trips is reflected in modal statistics. Both heavy rail and trolley show decreases in UPT between 1967 and 1992, and bus travel dropped between 1981 and 1992. Only light rail passenger miles have shown an overall increase through the entire measured period.

Table 30. Unlinked passenger trips of local government mass transit by mode, 1967-92
(1967=100)

Year	Total	Bus	Heavy rail	Light rail	Trolley
1967	100.0	100.0	100.0	100.0	100.0
1968	100.4	100.6	100.5	98.3	93.0
1969	101.1	101.1	102.1	98.3	85.2
1970	107.5	108.8	105.0	194.9	88.3
1971	104.3	107.4	99.7	193.0	79.9
1972	102.1	106.3	96.0	188.4	77.7
1973	104.2	113.7	92.1	188.3	67.3
1974	106.2	118.6	90.8	188.1	62.4
1975	110.3	127.0	90.0	178.8	60.4
1976	111.1	130.6	87.1	175.2	60.3
1977	110.7	130.2	86.6	175.6	62.9
1978	112.2	130.4	89.4	191.4	64.8
1979	121.0	143.6	93.1	193.4	66.7
1980	125.8	150.6	93.6	211.7	86.7
1981	126.4	152.1	93.0	213.2	87.6
1982	121.8	144.2	91.0	218.1	106.8
1983	119.2	136.5	94.3	231.1	109.4
1984	125.1	145.2	97.1	224.8	112.7
1985	123.1	140.0	100.1	221.7	99.0
1986	121.4	135.6	102.1	209.7	97.3
1987	119.7	130.5	104.4	221.4	98.5
1988	118.3	130.9	100.3	241.8	95.0
1989	120.1	132.6	102.2	255.9	90.8
1990	116.1	131.1	94.3	276.5	88.0
1991	111.3	127.5	87.3	290.7	87.3
1992	113.4	124.6	95.9	299.9	87.9
Average annual rate of change:					
1967-92	0.5	0.9	-0.2	4.5	-0.5

Weighted output indexes

To capture modal shifts in transit service through time, weighted output indexes were constructed for both the VRM and UPT series. The process was discussed earlier in this section and in chapter 2. Examination of the weighted and unweighted indexes shows remarkably little difference, a reflection of the dominance of bus and heavy rail in the transit series, and the absence of major shifts in the unit labor requirements through time (table 31).

Table 31. Weighted and unweighted output indexes for vehicle revenue miles and unlinked passenger trips in local government mass transit service, 1967-92
(1967=100)

Year	Vehicle revenue miles		Unlinked passenger trips	
	Weighted	Unweighted	Weighted	Unweighted
1967	100.0	100.0	100.0	100.0
1968	101.7	101.7	100.3	100.4
1969	104.2	104.2	101.1	101.1
1970	118.6	118.0	107.8	107.5
1971	121.5	120.8	104.6	104.3
1972	123.2	122.6	102.4	102.1
1973	131.8	132.7	104.4	104.2
1974	136.0	137.2	106.4	106.2
1975	142.3	144.5	110.4	110.3
1976	147.8	150.9	111.0	111.1
1977	146.7	150.5	110.7	110.7
1978	146.4	150.1	112.2	112.2
1979	147.7	151.3	121.0	121.0
1980	152.1	155.6	125.8	125.8
1981	156.6	160.1	126.4	126.4
1982	156.6	160.2	121.7	121.8
1983	154.0	157.3	119.0	119.2
1984	157.8	160.7	124.9	125.1
1985	159.3	162.0	123.0	123.1
1986	163.0	165.5	121.2	121.4
1987	164.0	166.0	119.5	119.7
1988	168.7	170.4	118.4	118.3
1989	174.7	176.6	120.2	120.1
1990	175.4	177.0	116.7	116.1
1991	173.0	174.0	112.2	111.3
1992	171.2	172.1	113.7	113.4
Average annual rate of change:				
1967-92	2.2	2.2	0.5	0.5

Labor inputs

There were about 206,000 State and local government employees in the transit field in 1992, 21,000 State and 185,000 local government. Special districts (60 percent), municipalities (35 percent), and counties (5 percent) employed the local government workers.[82]

Most (93 percent) transit employees are full-time employees. Comparable figures for electric, gas, and water are 97, 96 and 92, respectively. There has been a slight, but steady decrease in the percent of full-time transit employees over the past 25 years. Census statistics show that 99.5 percent were full-time employees in 1967; 98.7 percent in 1977; 95.0 percent in 1987; and 93.4 percent in 1992.

Two labor indexes, full-time-equivalent and total employment, are normally calculated for government productivity measures. The two indexes often move in concert, which has been the case with the enterprise services examined thus far, and is the case for mass transit. Because they do track closely, and data are readily available with which to calculate an FTE index, the calculations in this bulletin will use full-time-equivalent employees.

The employment indexes presented here were constructed from individual transit system data. It was necessary to collect and assemble the data by individual system to ensure that the data base included only government systems. Two separate periods and several different data sets were used in constructing the index. For 1967-78, data were taken primarily from APTA Transit Operating Reports, individual transit system reports, and selected research studies. For 1979-92, they were taken primarily from Department of Transportation National Transit Database.

The overall average annual increase in the transit FTE index is 2.6 percent, with increases in employment in 19 of the 25 years. However, over the last 3 years, 1990-92, employment decreased each year. The overall sample index parallels the Census transit index from 1967-87. Since 1987, Census employment has grown while the sample constructed for this study has decreased. The APTA employment index, which includes private as well as government, has also decreased during this period. This lends some credence to the sample constructed for this study. Nevertheless, the reason for the divergence between these indexes is unknown, but may become clearer with the publication of the 1992 Census benchmark data.

Transit modal employment shows very different rates of change. Bus, heavy rail, and light rail increased while trolley dropped slightly. The average annual increase for bus was 3.3 percent and 1.8 percent for heavy rail (subway). These two modes account for over 90 percent of sample transit employment. The largest modal labor increase was in the light rail (streetcar) index, which rose at an average annual rate of 5.3 percent. Trolley employment dropped by 0.8 percent annually during this period. All statistics are for 1967-92 (table 32).

Table 32. Labor indexes for local government mass transit by mode, 1967-92
(1967=100)

Year	Total	Bus	Heavy rail	Light rail	Trolley
1967	100.0	100.0	100.0	100.0	100.0
1968	102.0	100.7	104.2	101.6	94.5
1969	104.8	104.3	106.3	102.4	90.2
1970	117.3	121.1	112.9	170.2	88.1
1971	123.3	125.3	121.0	186.1	89.8
1972	127.2	130.1	124.0	189.9	89.8
1973	135.1	147.7	121.8	191.9	74.1
1974	143.3	160.8	125.1	203.1	63.2
1975	150.8	174.6	125.0	219.4	66.4
1976	156.2	185.0	124.7	220.3	66.1
1977	154.8	186.5	119.7	226.7	64.5
1978	156.7	189.4	118.4	298.1	65.1
1979	159.3	196.2	115.8	301.7	68.4
1980	169.2	207.4	124.7	302.3	73.0
1981	174.4	211.5	131.4	303.8	76.2
1982	177.5	215.0	134.0	306.3	81.8
1983	177.0	212.8	134.7	308.7	92.6
1984	182.1	218.3	140.3	292.4	92.5
1985	190.3	227.3	148.8	271.0	91.0
1986	193.3	228.2	152.2	329.7	101.7
1987	197.1	233.6	154.1	349.8	99.2
1988	196.7	233.4	153.4	360.1	95.4
1989	200.7	239.8	154.7	362.0	94.6
1990	198.2	236.4	152.8	372.5	90.4
1991	197.0	231.1	157.2	382.5	85.8
1992	192.5	225.4	154.4	363.7	81.3
Average annual rate of change:					
1967-92	2.6	3.3	1.8	5.3	-0.8

National productivity indexes

Local government transit labor and output increased during the 1967-92 period, but labor increased at a much more rapid rate, the net result being decreasing labor productivity. Although VRM and UPT both dropped during the period, unlinked passenger trips decreased at a somewhat greater rate (2.1 versus 0.5) as the number of vehicle miles driven has increased much more rapidly than the number of passengers using mass transit. Unlinked passenger trip labor productivity decreased in 20 of the 25 measured years, and continues to decrease. Vehicle revenue miles, however, have remained relatively stable, at least since 1982 (table 33).

Table 33. Two labor productivity indexes for local government mass transit service, 1967-92
(1967=100)

Year	Vehicle revenue miles	Unlinked passenger trips
1967	100.0	100.0
1968	99.7	98.3
1969	99.5	96.5
1970	101.1	91.9
1971	98.5	84.8
1972	96.9	80.5
1973	97.6	77.3
1974	94.9	74.2
1975	94.3	73.2
1976	94.6	71.1
1977	94.8	71.5
1978	93.4	71.6
1979	92.7	76.0
1980	89.9	74.3
1981	89.8	72.5
1982	88.2	68.5
1983	87.0	67.2
1984	86.7	68.6
1985	83.7	64.6
1986	84.4	62.7
1987	83.2	60.6
1988	85.8	60.2
1989	87.0	59.9
1990	88.5	58.9
1991	87.8	56.9
1992	88.9	59.1
Average annual rate of change:		
1967-92	-0.5	-2.1

Modal trend comparisons

Much the same picture—increasing employment and output and decreasing labor productivity—is found in the individual modal comparisons. Statistics for bus and heavy rail are presented here. Bus, which dominates mass transit, shows the same general trends as overall transit—increasing employment and output, and decreasing productivity. The drop in unlinked passenger trip productivity is much more rapid than the decrease in vehicle revenue mile productivity. Heavy rail, the second most important transit mode, also shows dropping labor productivity for both outputs (tables 34 and 35).

Table 34. Productivity indexes for local government bus service, 1967-92
(1967=100)

Year	FTE employees	VRM output	UPT output	VRM productivity	UPT productivity
1967	100.0	100.0	100.0	100.0	100.0
1968	100.7	101.3	100.6	100.6	100.0
1969	104.3	103.0	101.1	98.7	96.9
1970	121.1	120.9	108.8	99.8	89.8
1971	125.3	124.3	107.4	99.2	85.7
1972	130.1	129.6	106.3	99.6	81.7
1973	147.7	151.9	113.7	102.9	77.0
1974	160.8	159.2	118.6	99.0	73.7
1975	174.6	175.0	127.0	100.2	72.7
1976	185.0	188.7	130.6	102.0	70.6
1977	186.5	192.6	130.2	103.3	69.8
1978	189.4	192.7	130.4	101.8	68.9
1979	196.2	193.3	143.6	98.5	73.2
1980	207.4	197.4	150.6	95.1	72.6
1981	211.5	202.9	152.1	95.9	71.9
1982	215.0	203.2	144.2	94.5	67.1
1983	212.8	197.4	136.5	92.8	64.2
1984	218.3	198.4	145.2	90.9	66.5
1985	227.3	197.5	140.0	86.9	61.6
1986	228.2	200.0	135.6	87.6	59.4
1987	233.6	198.6	130.5	85.0	55.9
1988	233.4	201.0	130.9	86.1	56.1
1989	239.8	209.3	132.6	87.3	55.3
1990	236.4	208.7	131.1	88.3	55.4
1991	231.1	204.8	127.5	88.6	55.2
1992	225.4	201.7	124.6	89.5	55.3
Average annual rate of change:					
1967-92	3.3	2.8	0.9	-0.4	-2.3

Table 35. Productivity indexes for local government heavy rail service, 1967-92
(1967=100)

Year	FTE employees	VRM output	UPT output	VRM productivity	UPT productivity
1967	100.0	100.0	100.0	100.0	100.0
1968	104.2	102.7	100.5	98.6	96.5
1969	106.3	107.2	102.1	100.9	96.1
1970	112.9	114.7	105.0	101.6	93.0
1971	121.0	116.5	99.7	96.3	82.4
1972	124.0	113.7	96.0	91.7	77.4
1973	121.8	108.8	92.1	89.3	75.6
1974	125.1	110.1	90.8	88.0	72.6
1975	125.0	106.2	90.0	85.0	72.0
1976	124.7	103.1	87.1	82.7	69.8
1977	119.7	96.8	86.6	80.8	72.3
1978	118.4	95.4	89.4	80.6	75.5
1979	115.8	97.6	93.1	84.2	80.4
1980	124.7	102.5	93.6	82.2	75.1
1981	131.4	105.9	93.0	80.6	70.8
1982	134.0	105.6	91.0	78.8	67.9
1983	134.7	106.4	94.3	79.0	70.0
1984	140.3	113.5	97.1	80.9	69.2
1985	148.8	117.8	100.1	79.2	67.3
1986	152.2	123.1	102.1	80.9	67.0
1987	154.1	126.2	104.4	81.9	67.8
1988	153.4	133.2	100.3	86.9	65.4
1989	154.7	137.0	102.2	88.5	66.0
1990	152.8	138.2	94.3	90.4	61.7
1991	157.2	135.7	87.3	86.3	55.5
1992	154.4	135.2	95.9	87.6	62.1
Average annual rate of change:					
1967-92	1.8	1.2	-0.2	-0.5	-1.9

System trend comparisons

Thus far the discussion has focused on national trends. Individual system trends, which are of particular interest to facility operators, can also be calculated. This section presents productivity statistics for four of the six largest systems: New York, Chicago, Los Angeles, and Boston. Philadelphia and Washington, the other two systems that comprise the big six, are excluded because they were not included in the data base until the 1970s. The four large systems accounted for about 40 percent of all local government transit passenger trips in 1992.

The New York Metropolitan Transit Authority is the largest transit system in the United States by far. In 1992 it produced one-quarter of all unlinked passenger trips, in 1967 about one-half. New York also dominates transit employment. In 1967 it accounted for 54 percent of all employment, in 1992, 25 percent. Thus, it is hardly surprissing that the New York indexes mirror the national indexes.

For the entire period, 1967-92, the New York index of unlinked passenger trip productivity decreased 2.2 percent per year while the overall national index dropped 2.1 percent (table 36). For vehicle revenue mile productivity the figures were -0.3 percent and -0.5 percent, respectively (table 36 and 37).

Table 36. Comparison of unlinked passenger trip productivity indexes for total sample and New York City, Chicago, Los Angeles, and Boston transit systems, 1967-92
(1967=100)

Year	Total	New York	Chicago	Los Angeles	Boston
1967	100.0	100.0	100.0	100.0	100.0
1968	98.3	97.5	98.3	100.8	96.6
1969	96.5	97.4	95.0	104.8	85.1
1970	91.9	93.5	93.2	103.2	84.3
1971	84.8	83.3	87.6	99.6	74.4
1972	80.5	79.1	87.1	90.8	74.6
1973	77.3	77.2	84.5	92.5	80.2
1974	74.2	75.3	82.2	83.8	79.6
1975	73.2	75.1	79.5	72.3	84.9
1976	71.1	70.7	82.1	83.0	85.5
1977	71.5	73.7	86.9	77.8	94.4
1978	71.6	76.1	75.3	84.5	73.7
1979	76.0	78.3	94.8	104.8	74.5
1980	74.3	76.6	93.4	106.0	63.1
1981	72.5	73.8	90.3	98.9	67.4
1982	68.5	69.5	86.8	88.8	64.8
1983	67.2	67.8	89.9	100.0	75.9
1984	68.6	66.2	93.2	105.3	76.3
1985	64.6	63.4	99.0	112.8	79.3
1986	62.7	63.8	94.6	93.7	87.7
1987	60.6	63.1	87.8	86.5	87.8
1988	60.2	60.8	87.7	82.6	91.0
1989	59.9	68.7	88.1	104.9	86.9
1990	58.9	62.5	86.3	101.4	92.1
1991	56.9	56.7	80.0	106.8	88.5
1992	59.1	58.0	77.9	101.1	100.1
Average annual rate of change:					
1967-92	-2.1	-2.2	-1.0	0.0	0.0
1967-90	-2.3	-2.0	-.6	.1	-.4
1982-92	-1.5	-1.8	-1.1	1.3	4.4
1982-90	-1.9	-1.3	-.1	1.7	4.5

Table 37. Comparison of vehicle revenue mile productivity indexes for total sample and New York City, Chicago, Los Angeles, and Boston transit systems, 1967-92
(1967=100)

Year	Total	New York	Chicago	Los Angeles	Boston
1967	100.0	100.0	100.0	100.0	100.0
1968	99.7	99.3	99.2	101.9	98.6
1969	99.5	100.7	95.8	103.8	98.3
1970	101.1	100.2	94.7	102.9	87.8
1971	98.5	96.7	91.8	102.7	92.4
1972	96.9	93.9	91.1	98.1	93.5
1973	97.6	91.7	89.7	102.4	96.7
1974	94.9	88.7	87.7	94.9	91.7
1975	94.3	86.3	84.7	76.7	93.5
1976	94.6	83.0	83.0	85.2	97.9
1977	94.8	84.1	84.0	87.1	94.8
1978	93.4	82.3	81.2	88.4	78.9
1979	92.7	81.8	87.2	89.1	74.2
1980	89.9	84.3	83.7	82.7	76.3
1981	89.8	84.3	83.5	81.0	82.8
1982	88.2	81.9	82.1	78.4	87.2
1983	87.0	81.5	83.5	74.4	95.4
1984	86.7	83.8	81.9	72.6	97.3
1985	83.7	79.3	87.5	72.0	97.9
1986	84.4	81.7	87.3	65.6	112.4
1987	83.2	81.3	84.0	63.4	113.4
1988	85.8	94.1	85.9	62.4	116.9
1989	87.0	95.5	87.5	75.7	118.3
1990	88.5	96.4	87.3	75.6	122.1
1991	87.8	93.3	88.6	78.0	117.7
1992	88.9	93.1	86.8	73.1	133.9
Average annual rate of change:					
1967-92	-0.5	-0.3	-0.6	-1.2	1.2
1967-90	-.5	-.2	-.6	-1.2	.9
1982-92	.1	1.3	.6	-.7	4.4
1982-90	0	2.1	.8	-.4	4.3

Average annual rates of change for 1982-92 are presented in the tables. Prior to 1980, there are questions concerning data accuracy. Beginning year 1982 is used because it is a base year in the calculations. For 1982-92, the overall national passenger trip productivity index showed a change of -1.5 percent annually while New York registered -1.8 percent. For the vehicle revenue mile productivity index the national rate was 0.1 percent annually and the New York rate was 1.3 percent.

New York operates buses and heavy rail. Over the long term (1967-92), the vehicle revenue mile productivity index decreased for both modes at almost the same annual rate (-0.3 percent). As a point of comparison, the national statistics were -0.4 percent for buses and -0.5 percent for heavy rail (tables 34 and 35). The New York passenger trip annual rate was -3.3 percent for buses and -1.7 percent for heavy rail; the national statistics were -2.3 percent and -1.9 percent, respectively.

Chicago operated the second largest transit system in the United States in 1992, although it was a distant second to New York. Like New York, and the national sample, the Chicago Regional Transportation Authority showed declining output per employee year statistics for 1967-92. This is true for both the passenger trip (-1.0 percent) and revenue mile (-0.6 percent) productivity measures. Chicago operates bus and heavy rail modes, and until 1973 it also operated trolley buses. All three modes are included in the Chicago index.

Los Angeles (Southern California Rapid Transit District), the third largest system, operated only buses during the period covered by the indexes; light rail was added in 1990, but it is not included here. While most national and individual transit system productivity indexes show passenger trip productivity lagging vehicle revenue mile productivity, Los Angeles shows the opposite. The average annual rate of change for passenger trip productivity was essentially flat from 1967-92 while vehicle revenue mile productivity decreased at 1.2 percent per year.

Boston (Massachusetts Bay Transportation Authority) operated four modes in 1992: Bus, heavy rail, light rail, and trolley. It is the only system of the four that shows long-term vehicle revenue mile productivity gains (table 37). These gains have been particularly pronounced since the early 1980s. Moreover, each mode registered vehicle revenue mile productivity gains over the long run and since 1982.

Boston's 1992 unlinked passenger trip productivity index stood at about where it did in 1967 although there was a decline in the intervening years. In the case of the individual modes, the bus and trolley indexes showed decreasing labor productivity over the long term (1967-92) while heavy rail and light rail increased. All four modes registered increasing productivity between 1982 and 1992.

Modal level comparisons

Productivity levels, in contrast to trends, can provide a very different perspective or dimension on productivity. The conceptual and data requirements to calculate levels are much more demanding than those needed to calculate trends, and for most government services it is infeasible to calculate meaningful national productivity levels. Transit is an exception. As noted above, there is considerable research and general agreement as to what should be calculated, and good data are available on the transit industry.

Data for 1992 show that, on the average, there were 10,770 vehicle revenue miles logged for each full-time-equivalent operational employee in the sample. The statistics for the individual modes are the following: Bus, 10,930 miles; heavy rail, 10,840 miles; trolley, 7,930 miles; and light rail, 6,520 miles.

These data are available by system. The following array presents data for nine bus systems in 1992. These systems were selected for purposes of illustration only. That is, mid-size systems are included that have about the same number of vehicle revenue miles per FTE employee. Vehicle revenue mile and unlinked passenger trip per FTE

operational employee for the nine systems and the overall sample average show the following:

System	VRM/FTE	UPT/FTE
All systems	10,930	38,800
Sacramento, CA	12,840	29,820
Long Beach, CA	12,760	40,260
Norfolk, VA	12,720	18,210
Santa Clara, CA	12,300	28,420
Alameda, CA	12,260	35,570
Tacoma, WA	12,230	21,510
Dade County, FL	12,210	32,930
St. Louis, MO	12,170	28,450
Atlanta, GA	12,160	36,910

It is interesting to note that those bus systems which operate in the congested Eastern cities such as Boston, Philadelphia, and New York, show much lower vehicle revenue miles per employee. New York City, for example, registered only 6,680 vehicle miles per FTE employee. However, the picture is very different for unlinked passenger trips. The average number of passengers carried per FTE employee for all sample systems is 38,800 for 1992. But New York registered 48,320 and Chicago 54,230.

Most of the systems shown in the above array fall below the UPT sample average, and some, such as Norfolk, are far below the norm. However, Long Beach rises above the average for both passenger trips and revenue miles per employee.

State Alcoholic Beverage Sales

All States and many local governments regulate alcoholic beverage sales. States license sellers, tax sales, regulate advertising, set the legal age for purchase of beverages, and establish the hours and days of sale. In addition, about one-third of the States operate wholesale warehouses and/or retail alcoholic beverage stores. These operations are the focus of this section.[83]

Institutional setting

States which operate their own warehouses and retail stores using government employees are known as control or monopoly States. Those that use private sellers are known as license States. There are 18 control States and 33 license States including the District of Columbia in the United States. This discussion focuses on the control States. (table 38).

Although States are often divided between the issue of control and license, there is a broad spectrum of institutional arrangements in this area, from almost completely private operation to almost total government control and operation. These arrangements can be grouped into the following fairly distinct categories:

- Private retail and wholesale operations, in effect in more than half of the States.
- Private retail and government wholesale, as in Iowa, Mississippi, and Wyoming.
- Private and government (municipal) retail and private wholesale, as in Minnesota.
- Government (city and county) retail and private wholesale, as in North Carolina.
- Government and private agency retail and government wholesale, as in Ohio.
- Government retail and wholesale, as in Alabama and Virginia.

This study focuses on those States included under the second, fifth, and sixth category above. North Carolina is not included, because local authorities rather than State personnel operate the stores, and local data are not readily available with which to make productivity calculations.

The control States accounted for about 28 percent of the U.S. population and 24 percent of the gallons of spirits sold in the United States in 1992.[84] In that same year, State and local government alcoholic beverage sales totaled over $3.6 billion, with State government alone accounting for $3.1 billion.

Five control States—Pennsylvania, Michigan, Ohio, Virginia, and Washington—accounted for 66 percent of the revenue and 73 percent of the employment in fiscal 1992. Pennsylvania alone accounted for 22 percent of the revenue and 31 percent of the employment. These percentages have remained fairly stable over the past 20 years.[85]

Most State alcoholic beverage control commissions are responsible for four functions: Wholesale sales, retail sales, licensing, and enforcement. Each of the 17 control States operate wholesale alcoholic beverage facilities. Sixteen of them license others, such as wineries and restaurants, to sell alcohol. Twelve of the 17 are responsible for enforcement of State alcoholic beverage laws and regulations such as after hour sales and sales to minors. The other control States assign enforcement to State police, Departments of Public Safety, or in the case of Wyoming, to local government (table 38).

Table 38. Type of State alcoholic beverage control distribution, 1992

State	Type of sales		
	Wholesale State	Retail State	Retail agent
Alabama	X	X	—
Idaho	X	X	X
Iowa	X	—	—
Maine	X	X	—
Michigan	X	—	—
Mississippi	X	—	—
Montana	X	X	X
New Hampshire	X	X	X
Ohio	X	X	X
Oregon	X	—	X
Pennsylvania	X	X	—
Utah	X	X	—
Vermont	X	X	X
Virginia	X	X	—
Washington	X	X	X
West Virginia	X	—	—
Wyoming	X	—	—

State	Type of beverage sold by State		
	Spirits	Wine	Beer
Alabama	X	X	—
Idaho	X	X	X
Iowa	X	—	—
Maine	X	X	—
Michigan	X	—	—
Mississippi	X	X	—
Montana	X	X	—
New Hampshire	X	X	—
Ohio	X	—	—
Oregon	X	—	—
Pennsylvania	X	X	—
Utah	X	X	X
Vermont	X	X	—
Virginia	X	X	—
Washington	X	X	X
West Virginia	X	X	—
Wyoming	X	X	—

SOURCE: Personal communication from Jim Squeo of National Association of Beverage Control Authorities, October 1994, and *Summary of State Laws and Regulations Relating to Distilled Spirits*, Washington: Distilled Spirits Council of the United States, December, 1993.

This investigation includes wholesale as well as retail sales. Six of the 17 States are wholesale-only operations; the other 11 operate a combination of wholesale and retail. All of the 11 State retail operations sell spirits; 10 of these sell wine as well as spirits, and 3 also sell beer. Spirits account for about 80 percent of all gallons sold in State stores, wine about 20 percent, and beer less than 0.01 percent. Six of the 11 States that operate retail stores use agency (private) stores to augment their operations.

The agency arrangement is an important issue in calculating productivity. This arises when private retail merchants contract to operate agency outlets as part of their normal

operations. Control States have long used agents to serve sparsely populated areas where a "full-service" State store could not be justified. Ohio, for example, permits agents in municipalities with a population of less than 20,000. Agents are usually paid a percent of their gross sales, although some States pay a fixed fee or negotiate a price with the individual merchant. In all cases, prices of alcoholic beverages are set by the State.

In recent years States have increasingly turned to agent sales as they desired to cut back on government employment. Oregon, for example, reduced the number of its State stores from 20 in 1976 to 6 in 1980 before it turned entirely to agent sales in 1983. Maine, Montana, and Utah, among others, have also substituted agents for State-operated stores.

Utah uses three different forms of agency arrangements. In the first, agents operate beverage stores just as they might a State store, but do not hire State employees. In the second, merchants contract to sell alcoholic beverages in addition to their regular product lines. In the third, resort or hotel owners operate an agency store as a convenience to their guests, usually at no cost to the State.

In addition to the 17 control States, 6 States permit or require local government sales. North Carolina requires local government sales if alcoholic beverages are sold for use off-premise. Alaska, Maryland, Minnesota, South Dakota, and Wisconsin permit local option. Minnesota has a combination of private and municipal liquor stores.

Alcoholic beverage retail sales fall under SIC code 5921. The SIC defines alcoholic beverage retail stores as:

> Establishments primarily engaged in the retail sale of packaged alcoholic beverages, such as ale, beer, wine, and liquor, for consumption off the premises.[86]

Wholesale spirit and wine sales come under code 5182 and are defined as:

> Establishments primarily engaged in the wholesale distribution of distilled spirits, including neutral spirits and ethyl alcohol used in blended wines and distilled liquors.[87]

Alcoholic beverage control boards are assigned to SIC 9651, regulation, licensing, and inspection of commercial sectors.

The Bureau of Census, which generates much of the data used here, has two slightly different definitions for State alcoholic beverage operations. For financial transactions, it defines a "liquor store" as an alcoholic beverage distribution facility "operated by governments maintaining alcoholic beverage monopoly systems." It excludes expenditure for law enforcement and licensing activities carried out in conjunction with liquor store operations.[88]

For employment statistics, Census limits its definition to the "administration and operation of retail liquor stores operated by State governments."[89] However, statistics collected under this heading include wholesale as well as retail operations, and some licensing and enforcement personnel. The Census employment statistics do not include any local government personnel.

Outputs

This section discusses the measurement of State alcoholic beverage store outputs, and presents several indexes for such measurements. As noted earlier, many alcoholic beverage control authorities are responsible for enforcement and licensing as well as sales. Enforcement and licensing operations, which account for less than 10 percent of beverage commission employees, require a different set of output measures. They are not considered in this review, which focuses on sales of alcoholic beverages.

Sales of alcoholic beverages are commonly measured in one of five ways—dollars, customers, bottles, cases, or gallons.[90] Probably the best measure of output for calcu-

lating labor productivity is the number of bottles sold, in the case of retail sales, and the number of cases sold for wholesale sales. These two measures reflect a large part of the physical work involved in alcoholic beverage sales. However, data to calculate these two measures are not available for the early years.

The output measure that is used here is the number of gallons sold. It is physical, measurable, repetitive, easily understood, and the final output. Also, it is a readily available statistic that correlates highly with bottles and cases.

Although gallons are used as the basic measure of output, they are divided into three different services for productivity measurement purposes. First, is retail sales by government employees in State stores. Second, is retail sales by agents in private stores. These sales are handled by private employees but State employees handle wholesale and audit functions. The third service is wholesale sales by State employees; in this case all retail sales are by the private sector. The reasons that the three services are measured separately is that each has a different output, the outputs seem to change at very different rates, and two of the three outputs have very different unit labor requirements.

The index numbers for the three types of sales are shown in table 39. State retail store sales, as measured by the number of gallons sold, increased until 1979, at which point they start to drop. The average annual increase over the 1967-79 period was 2.7 percent. This reflects growing population, increases in disposable income, increases in the number of State stores, and promotion of sales in a number of States. In 1979 there was an abrupt change in industry growth and from 1979-92 sales decreased at a rate of 3.1 percent per annum. The decrease reflected a number of factors including decreasing per capita consumption, a shift by the States from retail to wholesale only, and to agent operations.

Agent sales are a small, but growing part of alcoholic beverage sales as more States turn to agents to handle their sales, particularly in the less densely populated areas. The long-term (1967-92), average annual agent sales increased by 4.1 percent. The average annual increase between 1967 and 1979 was 7.7 percent, but between 1979 and 1992 it had declined to 1.0 percent. There was a dramatic increase in 1992 when Ohio transferred a large part of its operations from State stores to agent operations.

There has been a modest increase in State wholesale sales during the measured period as States moved from retail to wholesale-only operations. The long-term average annual State wholesale sales increased by 1.4 percent. In 1967 there were three wholesale-only States, Michigan, Mississippi, and Wyoming, but by 1992 the number increased to five with the addition of Iowa and West Virginia. Even with the increase in the number of States there has been a slowdown in wholesale sales in recent years. Between 1979 and 1992, State government wholesale sales dropped, on average, 0.7 percent annually.

Table 39 also shows the overall change in output for State alcoholic beverage sales, both unweighted and weighted. The unweighted index reflects the total number of gallons sold by the States through the State-operated stores, agents, and warehouses. This index shows sales increasing at an average annual rate of 3.2 percent between 1967 and 1979 with increases in every year. Between 1979 and 1992, sales dropped in most years and the average annual rate of change was -2.2 percent.

The weighted index, which conceptually is the preferred index, reflects the retail, agent, and wholesale indexes weighted by their appropriate unit labor weights. To calculate the overall index, individual 5-year segments are calculated, each segment is base year weighted (1967, 1972, 1977, 1982, and 1987), and the individual segments are then linked to form the index.[91] The results of these calculations show sales increasing at an average annual rate of 2.9 percent between 1967 and 1979 with each year registering an increase. From 1979 through 1992, sales declined at an average annual rate of 2.8 percent, and output dropped every year. This rather abrupt change in output reflects the decrease in alcoholic beverage sales nationally and the shift from State to private sector operations. Over the long term (1967-92), the average annual rate of change is essentially flat.

Table 39. State alcoholic beverage sale indexes, 1967-92
(1967 = 100)

Year	Retail index	Agent index	Wholesale index	Unweighted output index	Weighted output index
1967	100.0	100.0	100.0	100.0	100.0
1968	103.5	109.9	107.0	104.4	103.9
1969	108.1	124.5	113.9	109.8	108.8
1970	111.3	128.2	119.9	113.6	112.2
1971	116.0	136.0	123.5	118.1	116.8
1972	120.2	146.1	133.0	123.6	121.5
1973	126.3	161.2	136.0	129.4	127.6
1974	126.4	172.8	139.5	130.6	128.0
1975	131.2	185.8	141.4	135.2	132.8
1976	132.2	195.1	143.8	136.8	133.9
1977	133.7	204.2	148.1	139.1	135.7
1978	137.6	220.2	154.5	143.9	139.9
1979	138.0	242.2	154.8	145.1	140.5
1980	136.9	249.7	155.0	144.6	139.6
1981	135.4	261.0	151.6	143.2	138.2
1982	131.6	256.1	148.8	139.6	134.4
1983	127.2	253.6	141.3	134.7	129.9
1984	123.7	248.2	140.8	131.6	126.4
1985	119.2	241.5	138.2	127.4	122.1
1986	115.3	239.0	131.8	123.1	118.0
1987	108.0	237.2	141.3	119.1	111.7
1988	102.3	232.8	143.1	114.9	106.5
1989	99.6	227.3	138.6	111.7	103.6
1990	98.3	233.1	143.1	111.8	102.7
1991	92.7	235.1	141.6	107.3	97.6
1992	91.9	275.9	141.2	108.1	97.3
Average annual rate of change:					
1967-92	-0.3	4.1	1.4	0.3	-0.1
1967-79	2.7	7.7	3.7	3.2	2.9
1979-92	-3.1	1.0	-.7	-2.2	-2.8

Labor inputs

The number of employees and the number of full-time equivalent employees are the two input measures suggested in chapter 2 for calculating State and local government labor indexes. When there are few part-time employees or little overtime work, as was the case with electric power, gas, water supply, and transit, the two labor series yield very similar trends. However, when there are a number of part-time employees and the ratio between part time and full time is changing, or the overtime worked changes through time, then the two indexes can diverge.

In the case of State alcoholic beverage operations, most statistics point to a change in the ratio between full-time and part-time employment. Furthermore, State retail stores use a large number of part-time employees. According to the Bureau of Census, part-time employment accounted for 17 percent of all State alcoholic beverage employees in 1977, but by 1992 the number had increased to 31 percent. Total employment data are not readily available prior to 1977 so it isn't known when the trend to increased use of part-time employees started. Also, the lack of data precludes the calculation of an index of the total number of employees.

A further potential complication in calculating a labor index, is the large number of part-time and intermittent beverage sales workers hired in the December holiday season. In addition, full-time employees often work overtime at this time. None of the

data reflect increased holiday employment because all the employment data are for the month of October. The calculations presented here assume that the ratio between October and the Holiday season has not changed.

Another potential problem in calculating an alcoholic beverage labor series is the inclusion of State enforcement and licensing personnel (and drug enforcement personnel in one State) in the summary statistics. Output statistics do not measure enforcement and licensing activities, and any employment index should exclude the personnel who perform these activities. However, the State data do not separately identify these individuals. Nevertheless, it is possible to estimate these individuals using State and National Association of Beverage Control Authorities (NABCA) data, and remove them from the overall totals.

The State alcoholic beverage sales FTE employment index has declined steadily over time (table 40). The long-term (1967-92) average annual employment decrease was 1.2 percent with employment dropping in 17 of the 25 years. Since 1979, employment has decreased every year except for 1985.

Table 40. State alcoholic beverage control sale productivity indexes, 1967-92
(1967 = 100)

Year	Output index	Labor index	Productivity index
1967	100.0	100.0	100.0
1968	103.9	103.1	100.8
1969	108.8	106.7	101.9
1970	112.2	111.2	100.9
1971	116.8	109.2	107.0
1972	121.5	109.7	110.8
1973	127.6	108.1	118.0
1974	128.0	107.6	119.0
1975	132.8	108.2	122.8
1976	133.9	108.3	123.7
1977	135.7	106.2	127.8
1978	139.9	107.3	130.3
1979	140.5	105.9	132.8
1980	139.6	105.8	131.9
1981	138.2	104.8	131.9
1982	134.4	99.7	134.8
1983	129.9	94.5	137.4
1984	126.4	91.2	138.7
1985	122.1	93.1	131.1
1986	118.0	92.7	127.4
1987	111.7	84.5	132.2
1988	106.5	82.3	129.4
1989	103.6	80.2	129.3
1990	102.7	79.2	129.8
1991	97.6	75.3	129.6
1992	97.3	73.2	132.8
Average annual rate of change:			
1967-92	-0.1	-1.2	1.1
1967-79	2.9	.5	2.4
1979-92	-2.8	-2.8	0

SOURCE: Table 39 and computed

Productivity indexes

The drop in employment coupled with relatively stable output has resulted in long-term increasing labor productivity for State alcoholic beverage operations. Between 1967 and 1992, the average annual increase was 1.1 percent. However, there have been two fairly distinct periods of change. During the period 1967-79, productivity increased, on average, by 2.4 percent annually; in later years, there has been little or no change (table 40).

Some States calculate productivity levels, such as the number of bottles or gallons sold per employee, for the State as a whole, and for individual stores. Such information can be extremely helpful in managing operations. However, because the type of service and organizational structure varies from State to State, productivity levels have not been calculated.

Government-private comparisons

Comparison of State and private alcoholic beverage sale labor productivity indexes show that between 1972 (the first year for which data for the private sector are available) and 1992, the average annual increase for the private sector and State government was the same, 0.9 percent. However, the rate of increase varied by the time period examined. The major growth period for State government productivity was in the early years, for the private sector it was the later years (table 41).

Table 41. Comparison of State government and private sector alcoholic beverage labor productivity indexes, 1972-92
(1972 = 100)

Year	State government index	Private sector index
1972	100.0	100.0
1973	106.4	100.0
1974	107.3	98.6
1975	110.7	95.5
1976	111.6	100.0
1977	115.3	99.3
1978	117.6	94.2
1979	119.8	95.6
1980	119.0	101.2
1981	119.0	103.0
1982	121.6	107.2
1983	124.0	101.3
1984	125.1	99.0
1985	118.3	108.0
1986	114.9	99.6
1987	119.2	106.3
1988	116.7	105.3
1989	116.7	109.2
1990	117.1	114.6
1991	116.9	116.0
1992	119.8	120.1
Average annual rate of change:		
1972-92	0.9	0.9
1972-77	2.9	-.1
1977-82	1.1	1.6
1982-87	-.4	-.2
1987-92	.1	2.5

SOURCE: Table 40 and *Productivity Measures for Selected Industries and Government Services,* BLS Bulletin 2440, table 173

State government output and labor input dropped at a more rapid rate than did private sector operations. This is partly due to the shift from government to private sales. The average annual change in State output between 1972 and 1992 was -1.1 percent while private store sales decreased 0.5 percent. Government labor decreased 2.0 percent annually between 1972-90. The decrease for private operations during this period was 1.4 percent.

These comparisons should be interpreted with care, for several reasons. First, State government outputs are measured in physical quantities, as discussed above, and private sector outputs are derived by deflated value.[92] Second, most private stores stock and sell non-alcoholic items, and these outputs are measured and included in the private sector output measure. There are no comparable outputs for State stores. Third, the private sector is solely a retail sales measure (SIC 5921), but the government measure includes warehouse or wholesale distribution too (SIC's 5921 and 5182, respectively).

Nevertheless, it is apparent that many of the changes that have affected private sector operations over the years, including decreasing consumption of spirits by the public, a shift to self service stores, and computerization of inventory and sales also affected government operations.

Summary and Conclusions

This chapter discussed the measurement of State and local government enterprise services. Five services were examined and average labor productivity indexes calculated for each. Four of these—electric power, natural gas, water supply, and mass transit—compose a group known by the Bureau of Census as State and local government utilities. The other enterprise service discussed here is State alcoholic beverage sales.

The Bureau of Economic Analysis (BEA) identifies 10 major State and local government functions as enterprise services. They accounted for about 920,000 State and local government full–time-equivalent employees in 1992 according to the Bureau of Economic Analysis. The five discussed in this bulletin accounted for 453,000 State and local government employees. BEA enterprise service employment doubled between 1967-92. Employment among the five services increased about 75 percent (257,000 to 453,000) over the 1967-92 period.

Labor productivity increased for three services and dropped for two over the measured period (table 42). Each service is briefly summarized.

Electric power. Labor productivity increased in this service, on average, 2.1 percent per year from 1967-92. Output and employment both rose during this period. In 1992, there were about 85,000 State and local government electric utility employees. Electric power utility operations is one of the easier services to measure because there is general agreement concerning the output measure, quality of output is not an issue, and data are generally available, particularly in recent years.

Natural gas. In contrast to electric power sales, natural gas shows decreasing labor productivity. The average annual decrease from 1974-92 is 1.6 percent. During the covered period, output dropped while employment rose. It is a service with a small number of government employees, fewer than 11,000 in 1992. There is general agreement as to the output measure for this service, and the data have been adequate since 1974.

Water supply. In contrast to electric power and natural gas, water supply is largely a government owned and operated service. There were about 156,000 local government water employees in 1992. Local government water utility labor productivity increased 0.6 percent annually between 1967 and 1992. Output and employment also increased during this period. While there is some question concerning the precise increase in output and productivity, the numerous statistical series examined for this publication point to increasing labor productivity. Water supply has one attribute that sets it apart from the other four services, and that is the importance of quality of service, and how this has affected output. Drinking water treatment and testing has been expanded dramatically since 1974, and there is general agreement that quality has improved.

Mass transit. This service shows decreasing labor productivity during the measured period, 1967-92. When the number of unlinked passenger trips is used as the output measure, the average annual decrease is 2.1 percent; the decrease for vehicle revenue hour output is 0.5. Although both measures are useful, the number of passenger trips seems to be more appropriate as a measure of output for an enterprise service. The data with which to calculate mass transit labor productivity are reasonably good in the early years and very good in later years. Mass transit is the largest service examined here in terms of the number of employees. In 1992 there were about 206,000 State and local government employees. This service also has seen massive growth in output and employment since 1967, as State and local government took over the operation of most failed private operations, extending and introducing operations into areas where none had been provided.

State alcoholic beverage sales. Many changes have occurred in this industry, in both the private and government sectors over the past 25 years. State output and employment dropped during the 25 years, but employment dropped faster. The result was an average annual increase in labor productivity of 1.1 percent over the 1967-92 period. There is general agreement on how outputs should be measured in this service, and the data are detailed and quite good. Although this is a relatively small State service, with about 11,000 employees in 1992, it is a function that generates considerable income for those States that operate retail sales stores.

Comparison of government and private services. Most State and local government enterprise services have private sector counterparts, including the five discussed here. Two—mass transit and water supply—are dominated by government, the other three—electric power, natural gas, and alcoholic beverage sales—are primarily privately owned and operated. For the latter three services there are private sector labor productivity indexes. Comparison of government and private labor productivity indexes show remarkably similar trends (table 43, and charts 4 to 6).

For electric power and natural gas, government and private labor productivity trends show very similar rates of growth. The average annual increase for government operated electric power utilities was 2.1 percent; for the private sector it was 2.3 percent. For natural gas it was -1.6 and -2.2, respectively. Alcoholic beverage sales show similar long-term trends, but very different periods of growth; State government productivity increased dramatically prior to 1980 while the private sector has shown the greatest increase after the mid-1980s.

Enterprise services are more easily measured than most other government services. Most have tangible outputs; are sold in the market place; cover their cost of production through fees and charges; and are supported by good national data.

Table 42. Enterprise service labor productivity indexes for five services, 1967-92
(1977 = 100)

Year	Electric power	Natural gas	Drinking water	Mass transit (trips)	Mass transit (miles)	Alcoholic beverages
1967	62.9		99.2	139.9	105.5	78.2
1968	69.4		101.5	137.5	105.2	78.8
1969	78.8		99.3	134.9	105.0	79.7
1970	82.1		98.7	128.6	106.7	79.0
1971	85.1		99.1	118.6	104.0	83.7
1972	86.6		101.3	112.6	102.2	86.7
1973	85.9		101.5	108.1	103.0	92.3
1974	85.1	107.3	98.5	103.8	100.2	93.1
1975	86.6	104.1	101.2	102.4	99.6	96.0
1976	91.3	101.8	100.0	99.5	99.9	96.8
1977	100.0	100.0	100.0	100.0	100.0	100.0
1978	98.2	101.1	95.8	100.1	98.5	102.0
1979	100.3	101.1	106.9	106.3	97.8	103.9
1980	101.7	107.5	106.2	104.0	94.8	103.2
1981	99.8	105.7	107.8	101.4	94.7	103.1
1982	97.4	97.5	104.0	95.9	93.1	105.5
1983	95.5	96.0	106.3	94.0	91.8	107.5
1984	94.1	100.3	111.5	95.9	91.5	108.5
1985	94.5	88.2	118.1	90.4	88.3	102.6
1986	94.1	79.5	121.2	87.7	89.0	99.7
1987	96.7	84.2	123.2	84.8	87.8	103.4
1988	101.5	83.4	122.6	84.2	90.5	101.2
1989	104.5	81.7	124.9	83.8	91.8	101.2
1990	106.6	78.0	122.3	82.4	93.4	101.5
1991	107.2	80.2	114.9	79.6	92.6	101.4
1992	104.5	80.6	114.5	82.6	93.8	103.9
Average annual rate of change:						
1967-92	2.1		0.6	-2.1	-0.5	1.1
1974-92	1.1	-1.6	.8	-1.3	-.4	.6
1977-92	.3	-1.4	.9	-1.3	-.4	.3
1967-72	6.6		.4	-4.2	-.6	2.1
1972-77	2.9		-.3	-2.3	-.4	2.9
1977-82	-.5	-.5	.8	-.8	-1.4	1.1
1982-87	-.1	-2.9	3.5	-2.4	-1.2	-.4
1987-92	1.6	-.9	-1.5	-.5	1.3	.1

SOURCE: Tables 13, 19, 26, 33, and 40

Table 43. Comparison of labor productivity trends for three government services and private sector industries, 1967-92

Year	Electric power (1967=100)		Natural gas (1974=100)		Alcohol beverage sale (1972=100)	
	Government	Private	Government	Private	Government	Private
1967	100.0	100.0				
1968	110.3	107.6				
1969	125.3	114.0				
1970	130.6	118.2				
1971	135.3	124.8				
1972	137.7	131.5			100.0	100.0
1973	136.6	135.8			106.4	100.0
1974	135.4	133.6	100.0	100.0	107.3	98.6
1975	137.8	142.4	97.0	99.4	110.7	95.5
1976	145.3	146.8	95.0	101.7	111.6	100.0
1977	159.0	153.7	93.2	98.1	115.3	99.3
1978	156.1	148.6	94.3	99.5	117.6	94.2
1979	159.5	146.6	94.2	101.4	119.8	95.6
1980	161.7	144.3	100.2	100.1	119.0	101.2
1981	158.7	143.1	98.6	96.3	119.0	103.0
1982	154.8	137.3	90.9	87.3	121.6	107.2
1983	151.8	139.7	89.5	79.7	124.0	101.3
1984	149.6	145.1	93.5	82.0	125.1	99.0
1985	150.4	143.5	82.2	80.6	118.3	108.0
1986	149.7	147.1	74.1	72.7	114.9	99.6
1987	153.8	154.3	78.5	70.6	119.2	106.3
1988	161.4	161.9	77.7	74.4	116.7	105.3
1989	166.2	166.2	76.2	73.0	116.7	109.2
1990	169.5	169.9	72.7	66.9	117.1	114.6
1991	170.5	175.0	74.8	66.2	116.9	116.0
1992	166.2	176.4	75.1	66.9	119.8	120.1
Average annual rate of change:						
1967-92	2.1	2.3				
1967-90	2.3	2.3				
1972-92					0.9	0.9
1974-92			-1.6	-2.2		
1967-72	6.6	5.6				
1972-77	2.9	3.2			2.9	-.1
1977-82	-.5	-2.2	-.5	-2.3	1.1	1.6
1982-87	-.1	2.4	-2.9	-4.1	-.4	-.2
1987-92	1.6	2.7	-.9	-1.1	.1	2.5

SOURCE: Tables 14, 20, and 41

Chart 4. State and local government and private electric power utility labor productivity indexes, 1967-92

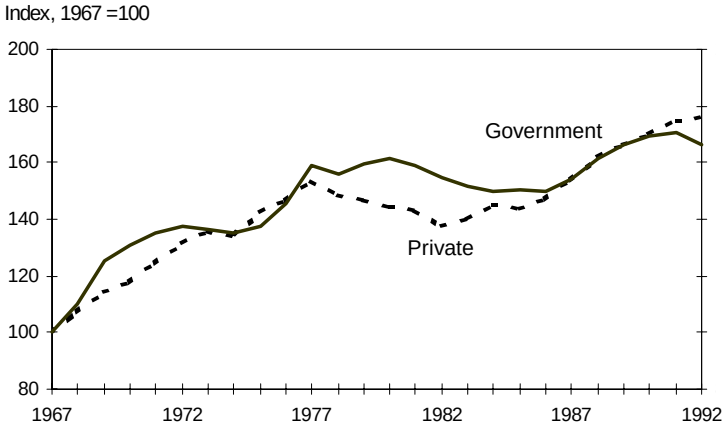


Chart 5. Local government and private natural gas utility labor productivity indexes, 1974-92

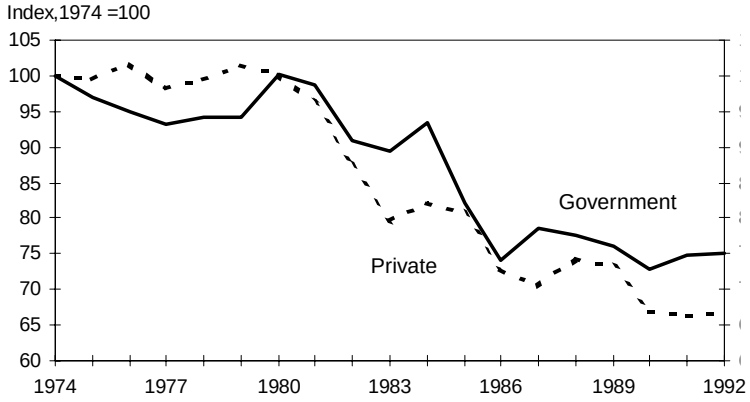
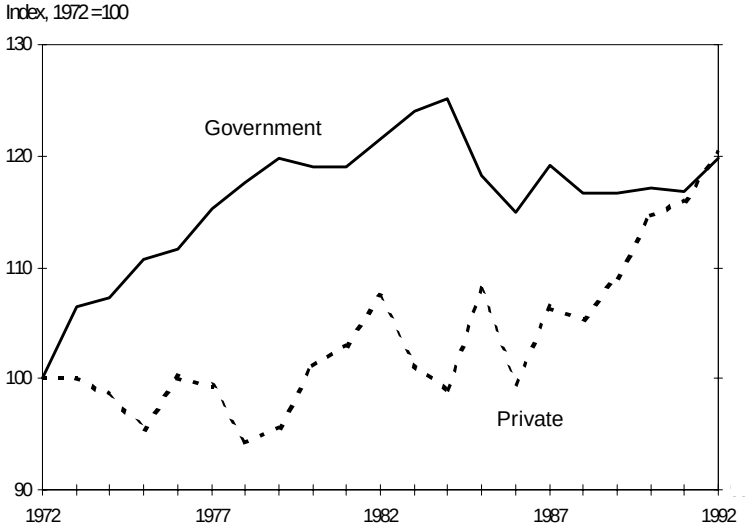


Chart 6. State government and private liquor store labor productivity indexes, 1972-92



Endnotes

[1] *Government Transactions*, "Methodology Papers: U.S. National Income and Product Accounts," (BEA-MP-5), Washington: U.S Bureau of Economic Analysis, November, 1988, p. 111.

[2] A somewhat dated, but more expansive, discussion of the measurement of State and local government electric power productivity is presented in BLS Bulletin 2166. See U.S. Bureau of Labor Statistics, *Measuring Productivity in State and Local Government*, (U.S. Department of Labor, Bureau of Labor Statistics), Bulletin 2166, December 1983, pp. 25-34.

[3] A "municipal" power utility is defined by the U.S. Department of Energy as "a city, county, irrigation district, drainage district, or other political subdivision or agency of a State competent under the laws thereof to carry on the business of developing, transmitting, utilizing or distributing power." See *Financial Statistics of Major U.S. Publicly Owned Electric Utilities 1992*, (U.S. Department of Energy, Energy Information Administration, 1994) p. 532.

[4] *Financial Statistics of Major U.S. Publicly Owned Electric Utilities 1992*, (U.S. Department of Energy, Energy Information Administration, 1994) p. 512.

[5] *Public Power*, January/February, 1994, p. 74.

[6] The Bureau of Census does not list any government electric power employment for Montana in 1987, but the U.S. Department of Energy shows one small system operated by the City of Troy in 1992. See *Electric Sales and Revenue—1992*, (Energy Information Administration, 1994), p. 57.

[7] Computed from 1987 Census of Governments—Compendium of Government Finances (Bureau of the Census, 1989), pp. 88 and 93; and 1987 Census of Governments—Compendium of Public Employment (U.S. Bureau of the Census, 1979), pp. 32 and 37.

[8] Computed from *Public Power*, January/February, 1994, p. 72, and *Financial Statistics of Major U.S. Publicly Owned Electric Utilities 1992*, (U.S. Department of Energy, Energy Information Administration, 1994) pp. 4 and 504.

[9] *Standard Industrial Classification Manual* (U.S. Office of Management and Budget, 1987), p. 284.

[10] William Iulo, *Electric Utilities—Costs and Performance*, (Pullman, Washington: State University Press, 1961), p. 30.

[11] "Gas and Electric Utilities—SIC 491, 492, 493," unpublished technical note, Office of Productivity and Technology, U.S. Bureau of Labor Statistics, July, 1989, and *Productivity Measures for Selected Industries and Government Services*, Bulletin 2440, Washington: U.S. Government Printing Office, March 1994, p. 81.

[12] William Iulo, *Electric Utilities—Costs and Performance*, (Pullman, Washington: State University Press, 1961), p. 30.

[13] In 1995 BLS switched to the Tornqvist procedure to calculate its industry productivity measures as noted in Chapter 2. The data presented here reflect the computational procedures used in 1992 and prior years. For further discussion see Kent Kunze, Mary Jablonski and Virginia Klarquist, "BLS modernizes industry labor productivity program," *Monthly Labor Review*, July 1995, pp. 3-12.

[14] *Financial Statistics of Major U.S. Publicly Owned Electric Utilities 1992*, (U.S. Department of Energy, Energy Information Administration, 1994) pp. 398 and 401.

[15] With the deregulation of the electric power industry this situation is likely to change as generation, transmission and distribution are handled by different firms.

[16] Personal communication from Diane Moody, American Public Power Association, July 1, 1994.

[17] See *Public Power*, annual January/February issue.

[18] See *Electric Sales and Revenue—1992*, (Energy Information Administration, 1994), p. 13.

[19] U.S. Bureau of the Census. *Public Employment: 1992*, Series GE/92-1. U.S. Government Printing Office, Washington, D.C., 1994, p. 5.

[20] There is a question concerning the difference in the annual rate of change between 1982 and 1987 for total employment and full-time equivalent employment. The size of this difference is apparently due to rounding and statistical discrepancies.

[21] See table 224 for government statistics and table 149 for private and cooperative utility statistics, *Productivity Measures for Selected Industries and Government Services*, Bulletin 2440, Washington: U.S. Bureau of Labor Statistics, 1994.

[22] Ibid.

[23] *Gas Facts-1991 Data*, Arlington, Virginia: American Gas Association, 1992, pp. 69-70 and 173.

[24] *Standard Industrial Classification Manual*, (U.S. Office of Management and Budget, 1987), p. 284.

[25] *Gas Facts—1991 Data*, Arlington, Virginia: American Gas Association, 1992, p. 2.

[26] Personal communication from Steve Owens, U.S. Bureau of the Census, September 9, 1994.

[27] *1987 Census of Governments—Compendium of Public Employment* (U.S. Bureau of the Census, 1989), pp. 33-83, and *1987 Census of Governments—Compendium of Government Finances* (U.S. Bureau of the Census, 1990), pp. 66-74.

[28] Purchased gas accounted for 50 percent of residential and 60 percent of commercial operating costs for investor-owned utilities in 1991. *Natural Gas 1992: Issues and Trends*, Washington: U.S. Energy Information Agency, March, 1993, pp. 74-6.

[29] Payroll accounted for 15 percent of investor-owned utility operations in 1991. *Gas Facts—1991 Data*, Arlington, Virginia: American Gas Association, 1992, p. 168.

[30] The American Gas Association and others, classify all local government gas utilities as "municipal" utilities. In this bulletin, the term "municipal" is used in its more restricted sense, that is, one of several types of local government.

[31] A British thermal unit (BTU) is the quantity of heat that must be added to one pound of water to raise its temperature one degree Fahrenheit under fixed temperature and pressure. A cubic foot is 1,025.8 BTU's.

[32] "Gas and Electric Utilities—SIC 491, 492, 493," unpublished technical note, Office of Productivity and Technology, U.S. Bureau of Labor Statistics, July, 1989, and *Productivity Measures for Selected Industries and Government Services*, Bulletin 2440, Washington: U.S. Government Printing Office, March 1994, p. 81.

[33] BLS recently switched to the Tornqvist procedure to calculate its industry productivity measures as noted in chapter 2. The data presented in this bulletin reflect the computational procedures used in 1992 and prior years. For further discussion see Kent Kunze, Mary Jablonski and Virginia Klarquist, "BLS Modernizes Industry Labor Productivity Program," *Monthly Labor Review*, July 1995, pp. 3-12.

[34] U.S. Bureau of the Census. *Public Employment: 1992*, Series GE/92-1, Washington: U.S. Government Printing Office, Washington, DC 1994, p. 6.

[35] See table 150. *Productivity Measures for Selected Industries and Government Services*, Bulletin 2440, Washington: U.S. Government Printing Office, March 1994.

[36] "Drinking Water: Stronger Efforts Essential for Small Communities to Comply with Standards," Washington: U.S. General Accounting Office, March 1994, pp. 8-9.

[37] "Drinking Water: Stronger Efforts Essential for Small Communities to Comply with Standards," Washington: U.S. General Accounting Office, March 1994, p. 9.

[38] "Environmental Investments: The Cost of a Clean Environment," *Report of the Administrator of the Environmental Protection Agency to the Congress of the United States*, EPA-230-11-90-083, Washington: U.S. Environmental Protection Agency, November, 1990, p. F-16.

[39] U.S. Bureau of the Census, *Government Finances: 1991-92*, Series GF92/5, Washington: U.S. Government Printing Office, 1996, p. 39 and U.S. Bureau of the Census, *Public Employment: 1992*, Series GE/92-1, Washington: U.S. Government Printing Office, 1994, pp. 5-8.

[40] These statistics exclude the District of Columbia. See U.S. Bureau of Census, *1992 Census of Governments—Government Organization*, Washington: U.S. Government Printing Office, 1994, pp. 12-21.

[41] William Fox, *Size Economies in Local Government Services: A Review*, Washington: U.S. Department of Agriculture, 1980, pp. 26-30.

[42] Robert M. Clark, The Safe Drinking Water Act: Its Implications for Planning," in David Holz and Scott Sebastian (eds.), *Municipal Water Systems: A Challenge for Urban Resource Management*, Bloomington: Indiana University Press, 1978, pp. 117-37.

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[44] U.S. Bureau of Census, *Government Finances: 1991-92*, Series GF92/5, Washington: U.S. Government Printing Office, 1996, p. 16.

[45] James I. Gillean and others, "The Cost of Water Supply and Water Utility Management," Contract Report 60-03-2071 (Cincinnati: U. S. Environmental Protection Agency, 1977), p. 9.

[46] Robert M. Clark and James I. Gillean, "The Cost of Water Supply Utility Management," *Environmental Modeling and Simulation, Proceedings of the Conference*, Cincinnati, Ohio: U.S. Environmental Protection Agency, 1976, pp. 808-813.

[47] U.S. Office of Management and Budget, *Standard Industrial Classification Manual*, Washington: U.S. Government Printing Office, 1987, p. 285.

[48] "Drinking Water Program: States Face Increased Difficulties in Meeting Basic Requirements," RCED-93-144, Washington: U.S. General Accounting Office, June 1993, p. 6.

[49] Robert M. Clark, "Small Water Systems: Role of Technology," *Journal of the Environmental Engineering Division*, American Society of Civil Engineers, Vol. 106, No. EE1, Proceedings Paper 15181, February 1980, p. 25.

[50] Computed from community water system sample data as collected by Temple, Barker, and Sloane for 1975 and 1980 and Research Triangle Institute for 1985. Research sponsored by Office of Drinking Water, U.S. Environmental Protection Agency.

[51] "Drinking Water: Compliance Problems Undermine EPA Programs as New Challenges Emerge," GAO/RCED 90-127, Washington: U.S. General Accounting Office, June, 1990, p. 53.

[52] "Environmental Investments: The Cost of a Clean Environment," EPA-230-11-90-083, Washington: U.S. Environmental Protection Agency, November, 1990, p. F-16.

[53] "Environmental Investments: The Cost of a Clean Environment," EPA-230-11-90-083, Washington: U.S. Environmental Protection Agency, November, 1990, pp. 4-16 to 4-24.

[54] Harry P. Hatry, et. al., *Efficiency Measurement for Local Government Services*, Washington: Urban Institute, 1979, pp. 35-42, and Harry P. Hatry, et. al., *Service Efforts and Accomplishments Reporting: Its Time Has Come*. Norwalk, Connecticut: U.S. Government Accounting Standards Board, 1990.

[55] Robert M. Clark, John A. Machisko and Richard G. Stevie, "Cost of Water Supply: Selected Case Studies," *Journal of The Environment Engineering Division*, February, 1979, p. 90.

[56] John E. Schefter, "Domestic Water Use in the United States, 1960-85," *National Water Summary 1987 - Hydrologic Events and Water Supply and Use*, Washington: U.S. Government Printing Office, 1990, p. 75.

[57] "Additional Federal Aid for Urban Water Distribution Systems Should Wait Until Needs are Clearly Established," Washington: U.S. General Accounting Office, November 24, 1980, p. 30.

[58] John E. Schefter, "Domestic Water Use in the United States, 1960-85," *National Water Summary 1987—Hydrologic Events and Water Supply and Use*, Washington: U.S. Government Printing Office, 1990, p. 79.

[59] "Environmental Investments: The Cost of a Clean Environment," EPA-230-11-90-083, Washington: U.S. Environmental Protection Agency, November, 1990, pp. F16-20.

[60] Gary L. Rutledge and Christine R. Vogan, "Pollution Abatement and Control Expenditures, 1972-92," *Survey of Current Business*, May, 1994, pp. 36-49.

[61] Wayne B. Solley, Robert R. Pierce and Howard A. Perlman, *Estimated Use of Water in the United States in 1990*, USGS Circular 1081, Washington: U.S. Government Printing Office, 1993.

[62] U.S. Bureau of the Census, *Public Employment: 1992*, Series GE/92-1, Washington: U.S. Government Printing Office, 1994, pp. 5-8.

[63] U.S. Bureau of the Census, *City Employment: 1992*, Series GE/92-2. Washington: U.S. Government Printing Office, 1994.

[64] *1993 Transit Fact Book* (American Public Transit Association, November, 1993), p. 33.

[65] Ibid.

[66] U.S. Bureau of the Census, *Government Finances: 1991-92*, Series GF/92-5. Washington: U.S. Government Printing Office, Washington, D.C. 1996, pp. 10 and 16.

[67] "National Transit Summaries and Trends," (as taken from the 1992 National Transit Database), Washington: U.S. Federal Transit Administration, May, 1994, p. 3.

[68] Ibid.

[69] *National Transit Summaries and Trends*, (as taken from the 1992 National Transit Database), Washington: U.S. Federal Transit Administration, May, 1994, pp. 15, 24-25 and 47.

[70] *National Transit Summaries and Trends*, (as taken from the 1992 National Transit Database), Washington: U.S. Federal Transit Administration, May, 1994, pp. 26-27.

[71] *National Transit Summaries and Trends*, (as taken from the 1992 National Transit Database), Washington: U.S. Federal Transit Administration, May, 1994, pp. 28-29.

[72] *National Transit Summaries and Trends*, (as taken from the 1992 National Transit Database), Washington: U.S. Federal Transit Administration, May, 1994, pp. 30-31.

[73] *National Transit Summaries and Trends*, (as taken from the 1992 National Transit Database), Washington: U.S. Federal Transit Administration, May, 1994, pp. 34-35.

[74] *National Transit Summaries and Trends*, (as taken from the 1992 National Transit Database), Washington: U.S. Federal Transit Administration, May, 1994, pp. 3, 15, and 32-33.

[75] *Standard Industrial Classification Manual*, 1987, Washington: U.S. Office of Management and Budget, 1987, p. 267.

[76] Gordon J. Fielding, Roy E. Glauthier and Charles A. Love, *Development of Performance Indicators for Transit*, (Irvine, California: University of California, Institute of Transportation Studies, 1977); Wanda A. Wallace, "Mass Transit," chapter 7, in Harry P. Hatry, et. al., *Service Efforts and Accomplishments Reporting: Its Time Has Come*, Norwalk, Connecticut: Governmental Accounting Standards Board, 1990.

[77] Gordon J. Fielding, Roy E. Glauthier and Charles A. Love, *Development of Performance Indicators for Transit*, (Irvine, California: University of California, Institute of Transportation Studies, 1977), p. 32.

[78] B. M. Deakin and T. Seward, *Productivity in Transportation* (Cambridge, England: Cambridge University Press, 1969); John W. Kendrick, "Productivity Trends in U.S. Transportation Industries," as cited in Scheppach and Woehlcke; Raymond C. Scheppach, Jr. and L. Carl Woehlcke, *Transportation Productivity* (Lexington, MA: Lexington Books, 1975); and U.S. Bureau of Labor Statistics, *Productivity Measures for Selected Industries and Government Services*, Bulletin 2440, (Washington: U.S. Government Printing Office, March 1994).

[79] These statistics are for total transit employment, private and government, as presented in the *1993 Transit Fact Book* (American Public Transit Association, November, 1993), p. 98.

[80] For further details see table 52, p. 71 of U.S. Bureau of Labor Statistics, *Measuring Productivity in State and local Government*, BLS Bulletin 2166, Washington: U.S. Government Printing Office, December 1983.

[81] The sample coverage reflects total sample employment as a percent of total local government employment reported in the U.S. Bureau of the Census, *Public Employment: 1992*, Series GE/92-1. U.S. Government Printing Office, Washington, DC. 1994, p. 6.

[82] U.S. Bureau of Census, *Public Employment: 1992*, Series GE/92-1, U.S. Government Printing Office, Washington, DC 1994, pp. 5-8.

[83] A dated, but more detailed discussion of the measurement of State alcoholic beverage control sales is presented in BLS Bulletin 2166. See U.S. Bureau of Labor Statistics, *Measuring Productivity in State and Local Government*, (U.S. Department of Labor, Bureau of Labor Statistics), Bulletin 2166, December 1983, pp. 34-42.

[84] North Carolina, a control State, is included in these statistics although all sales are by local authorities.

[85] U.S. Bureau of the Census. *Public Employment: 1992*, Series GE/92-1. U.S. Government Printing Office, Washington, D.C. 1994, p. 24 with adjustments; and *Government Finances: 1991-92*, U.S. Government Printing Office, Washington, D.C. 1994. p. 20.

[86] *Standard Industrial Classification Manual*(1987), Washington: U.S. Office of Management and Budget, 1987, p. 329.

[87] *Standard Industrial Classification Manual* (1987), Washington: U.S. Office of Management and Budget, 1987, p. 310.

[88] *U.S. Bureau of the Census. Government Finances: 1990-91,* Series GF/91-5, U.S. Government Printing Office, Washington, DC, 1993, p. A-5.

[89] U.S. Bureau of the Census. *Public Employment: 1992*, Series GE/92-1. U.S. Government Printing Office, Washington, D.C. 1994, p. A-4.

[90] A discussion of the strengths and weaknesses of the individual measures is presented in Bulletin 2166. See U.S. Bureau of Labor Statistics, *Measuring Productivity in State and Local Government*, (U.S. Department of Labor, Bureau of Labor Statistics) Bulletin 2166, December 1983, pp. 38-39.

[91] The BLS recently switched to the Tornqvist procedure to calculate its industry productivity measures as noted in Chapter 2. The statistics presented here reflect the computational procedures used in 1992 and prior years. For further discussion see Kent Kunze, Mary Jablonski and Virginia Klarquist, "BLS Modernizes Industry Labor Productivity Program," *Monthly Labor Review*, July 1995, pp. 3-12.

[92] *BLS Handbook of Methods*, U.S. Bureau of Labor Statistics, September 1992 (BLS Bulletin 2414) and James D. York, "Retail Liquor Stores Experience Flat Trend in Productivity," *Monthly Labor Review*, February, 1987, pp. 25-29.

Chapter 4. Corrections

This chapter discusses the measurement of labor productivity for State and local government correctional services. Correctional services, in contrast to the enterprise services, are a general government service that is supported almost entirely by general revenue. There is no marketplace price, outputs are debatable, and managers lack control over the demand for their services. There are even questions as to what is included in correctional services.

The Bureau of the Census defines corrections as the "confinement and correction of adults and minors convicted of offenses against the law, and pardon, probation, and parole activities."[1] For purposes of BLS productivity statistics, corrections include all the activities undertaken by State and local government employees assigned to the field.

All States, and many local governments, operate correctional programs. Corrections account for about 3.5 percent of all State and local government employment and 4.0 percent of all full-time-equivalent employees. It is one of the fastest, if not the fastest, growing government service. In 1967, there were about 124,000 State and local government employees in this service. By 1992, the number had reached 543,000, an average annual growth of 6.1 percent.[2]

State and local governments spent over $28.7 billion in fiscal 1992 on corrections. Capital expenditures accounted for about 14 percent of the total, operations for the other 86 percent. More than three-quarters of the operational expenditures (77 percent) went to labor compensation (salaries, wages, and benefits); the rest was devoted to the purchase of supplies, contract services, and the like (table 44). Most productivity studies of corrections flow from an examination of cost functions. As noted in chapter 2, the cost function is the dual of the production function. Since most correction managers control their organization's costs, but not their outputs or the type of programs provided, the cost function is the appropriate structure for measuring productivity. Also, cost data are generally available or can be estimated for most correctional facilities.

Table 44. Expenditures of State and local government on corrections, fiscal year 1992
(millions of dollars)

Expenditure category	Total	State	Local
Total	$28,701	$18,401	$10,300
Capital:			
Total	3,885	2,276	1,609
Construction	3,427	1,982	1,445
Other	458	294	164
Current operations:			
Total	24,815	16,125	8,691
Compensation	19,146	12,349	6,797
Other	5,669	3,776	1,894

NOTE: Totals may not add because of rounding.

SOURCE: U.S. Bureau of the Census, *Government Finances: 1991-92* and *Public Employment* 1992; compensation and other estimated

The number of adults under State or local government correctional supervision, either incarcerated or under supervised release (probation or parole) reached 4.6 million in 1992.[3] In addition, there were about 60,000 juveniles held in State and local government facilities, and an unknown number in aftercare or on probation. The number of known offenders has increased dramatically since 1967, the first year of the BLS indexes. The exact numbers are not known, but rough calculations suggest that the increase in adult offenders is about 7 percent per year.

These data are for the entire correctional field. Resource and offender estimates for the individual parts, such as prisons and jails, are presented later in this chapter.

Four basic parts of corrections services are reviewed here: State adult correctional institutions, local jails, adult probation and parole, and juvenile correctional institutions. State adult correctional institutions are primarily State prisons, but include some State-operated jails and community facilities such as halfway houses. This bulletin uses the terms adult correctional institutions and prisons interchangeably.

On the following pages each of the four parts is briefly discussed, potential output measures are examined, data to calculate indexes are presented, and indexes are calculated for prisons, jails, and juvenile correctional institutions. It is not possible to calculate an index for adult probation and parole services because of insufficient data. The final section of this chapter presents findings and conclusions.

State Adult Correctional Institutions

State adult correctional institutions are the most important part of State and local government correctional services, at least in so far as employment and cost are concerned. Also, it is one of the more rapidly growing State services. Between 1967 and 1992, the number of inmates held by the States increased by 325 percent. By the end of 1992, over three-quarters of a million inmates were held in State facilities.

Institutional setting

State governments spent almost $10 billion to operate their adult facilities in 1990, the last year for which data are available. The annual average cost per prisoner in 1990 was about $15,600. However, the true cost was somewhat higher because of the cost of uncounted State expenditures, such as benefits and services supplied by non-correctional State agencies, such as departments of health and education. In addition to operating costs, State governments spent another one-half billion dollars on capital facilities.[4]

Every State and the District of Columbia operates correctional institutions. For most States, this means operation of State prisons, and in some cases, operation of community facilities. Moreover, for seven jurisdictions—Alaska, Connecticut, Delaware, District of Columbia, Hawaii, Rhode Island and Vermont—this also means operation of jails, normally a local government function.

In 1990 there were about 246,000 State employees assigned to State adult correctional institutions. This is 75 percent of all State correctional employees. The remaining State correctional employees were assigned to probation, pardon, parole, juvenile activities, overhead, and miscellaneous activities. State adult correctional institutions accounted for about 73 percent of State correctional budgets in 1990.[5]

The States with the largest number of inmates and the largest annual expenditures are those with the largest population, that is California, Texas, and New York. California, alone, held over 90,000 inmates, operated 100 facilities, and spent over $2 billion dollars on its prisons in 1990. At the other end of the scale, North Dakota operated two facilities with fewer than 600 inmates, and spent less than $10 million.[6]

Labor is the most important resource, by far, in the operations of State adult institutions. One very detailed examination of New York State prisons concluded that employee costs accounted for about 80 percent of State operating costs in fiscal 1978.[7] Another study, this one of the Virginia prison system, found that approximately 70 percent of prison operating costs in 1985 were allocated to personnel services and benefits.[8] A study of selected Federal and State prisons found that personnel costs varied

between 65 and 93 percent of total operating costs, depending on the facility, with the average being 75 percent.[9] In short, while overall comprehensive national statistics are lacking, the readily available evidence suggests that labor comprises the largest part of State institutional operating costs. Consequently, it should be a good measure of the resources used to operate State adult correctional institutions.

The States operated, or were responsible for operating, 1,207 facilities in 1990, the last year for which detailed statistics on prison operations are available. Most of the facilities were general confinement prisons, but the States also operated reception and diagnostic centers, farms, road camps, boot camps, and medical treatment centers. About 97 percent of all inmates are housed in these facilities. Another 3 percent are housed in the 250 State operated or supervised community-based facilities that served as work release and pre-release centers.

Large confinement facilities dominate the State prison scene with more than half of all inmates confined in facilities having 1,000 or more prisoners.[10] Larger facilities generally require less labor per prisoner to operate than the smaller ones. Facilities with 1-499 inmates employ 1 person for every 2.2 inmates; facilities with 500-999 inmates employ 1 person for every 2.5 inmates; and facilities with 1,000 or more inmates employ 1 person for every 3.1 inmates. These same general relationships hold for individual occupational groups. That is, there are fewer custodial and security, treatment and educational, maintenance and food service, and clerical and administrative personnel per inmate in the larger prisons than in the smaller institutions relative to the prison population.[11]

State facilities are often categorized by level of security requirements—maximum, medium, and minimum—and the inmates are evaluated and assigned accordingly. In 1990, 38 percent of the inmates were assigned to maximum security facilities, 49 percent to medium and 13 percent to minimum. Most (about 95 percent) inmates are male.[12]

The courts play a major role in prison operations. Prior to the 1960s, the courts did not insert themselves into this arena. In 1974, a U.S. Supreme Court decision changed this when it upheld a lower court ruling that a prisoner is not "stripped of (his) constitutional protection when he is imprisoned for crime."[13] Over the past two decades, the courts have issued a number of remedial orders, and as of June 1990, 323 State facilities were under some type of order or court imposed edict. Court actions focus on crowding, medical and health practices, food service, sanitation conditions, and due process.[14] They have had a major impact on prison staffing and labor productivity.

The measurements covered in this discussion include most of the correctional institutions operated in the 50 States by State governments and the District of Columbia. They are classified by the SIC as correctional institutions, SIC 9223, and defined as follows:

> Government establishments primarily engaged in the confinement and correction of offenders sentenced by a court. Private establishments primarily engaged in the confinement and correction of offenders sentenced by a court are classified in Services, Industry 8744. Halfway houses for ex-convicts and homes for delinquents are classified in Services, Industry 8361. (The following types of facilities are included in this SIC:)
>
> Correctional institutions
> Detention centers
> Honor camps
> Houses of correction
> Jails[15]
> Penitentiaries
> Prison farms
> Prisons
> Reformatories

Because jails run by local governments are excluded from the accompanying indexes for 44 States, only part of SIC 9223 is included in this measure.

In addition to the adult correctional institutions, community institutions (e.g., halfway houses) operated by State governments are included. They are part of SIC 8361, residential care:

> Establishments primarily engaged in the provision of residential social and personal care for children, the aged, and special categories of persons with some limits on ability for self-care, but where medical care is not a major element. Included are establishments providing 24-hour year-round care for children. Boarding schools providing elementary and secondary education are classified in Industry 8211. Establishments primarily engaged in providing nursing and health-related personal care are classified in Industry Group 805.[16]

The focus here is on State adult correctional institutions. State juvenile operations, adult parole, pardon and probation operations, Federal facilities, and most local correctional operations are excluded. Six States and the District of Columbia operate local jails, and these operations are included because the employees are included in the statistical counts.[17] The following discussion sometimes uses the term "prisons" when referring to all State adult correctional institutions.

Outputs

This section discusses the measures that might be used to calculate the output of State prisons and community confinement facilities, reviews the data available to compute the measures, selects the preferred measure, and calculates the index.

Candidate measures

There are literally dozens of indicators that are routinely used to measure prison operations and assess the performance of State adult correctional institutions.[18] Three of them are discussed here. But first, because they are so often discussed in the correctional literature, prison outcomes are briefly examined.

Outcomes assess the results of government activity. For prisons, outcomes might measure the rate of recidivism. Specific measures include:

- Number or percent of former inmates who are incarcerated within 3 years of release;
- Number of convictions within 3 years of release;
- Percent of time employed within 5 years of release;
- Average weekly earnings the first year following release;
- Percent who work in a job using the skills learned in prison.

While important, these are all measures of *outcomes or the results* of correctional work. They are not the work of correctional institutions.

Adult correctional institutions process prisoners into facilities, test them, house and feed them, guard them, educate and train them, and process them out of facilities. One study characterized these activities as "hotel services." While some analyses attempt to measure individual activities such as these, most simply use the number of prisoners, or some variation, as the measure of institutional output.[19] Moreover, most governments simply use a 'set dollar cost per inmate per day' to reimburse other governments or private firms to house their prisoners. There is considerable prisoner contracting because of facility crowding, as discussed elsewhere in this chapter.[20] In short, the number of prisoners is a reasonable proxy measure for the work performed.

The three output measures reviewed in this section are:

- Number of inmates incarcerated
- Number of inmates incarcerated differentiated by level of security
- Number of inmates incarcerated differentiated by program service.

The criteria used to evaluate each measure are presented in chapter 2.

The first output measure to be considered is the number of inmates incarcerated. If there is a single goal or objective of State correctional institution operations it is incarceration. Politicians, academics, the courts, and the general public all seem to agree on this objective, and most institutional activities and processes, including housing, food service, medicine, and recreation, go to support it. Even inmate rehabilitative activities, such as counseling, education, and training, are part of the incarceration process. Most prison officials strongly support rehabilitative activities for their positive influence on inmate behavior while in confinement. That is, they view such programs as an extension of their control mechanisms.

This measure, the number of inmates incarcerated, satisfies all the criteria listed in chapter 2. It is measurable, repetitive, accurate, easily understood, and the final output of the correctional institution. Also, there seems to be a good relationship between the number of inmates and institutional staffing. That is, staffing is dictated by:

> the characteristics and needs of (the) inmate population; the level of security required; the type of work, training, or rehabilitative programs provided; the physical layout of the facility; scheduled work hours, shift arrangements, and leave provisions; and (others).[21]

There are several variations of this basic measure. One uses an end-period count (such as a year-end) as contrasted with a count of the average number of inmates held over the period (the average daily population count). For conceptual reasons, the average daily count measure is preferred because it tracks fluctuations in the number of prisoners accommodated. It should be more closely related to the resources expended than the year-end measure. Irrespective of which measure is used, the same measure should be used from year to year. Also, a comparable resource or labor measure should be used. That is, a year-end inmate index should use a year-end labor measure and an average daily inmate count should be matched with an average daily labor measure.

Another variation of the measure distinguishes between the number of prisoners actually housed and the number under the jurisdiction of the State. In the latter case, another jurisdiction or organization such as a local jail, a prison in another State, a private correctional facility, or a Federal prison can house prisoners. Because the focus is on the work performed by State employees, an output measure should count only those prisoners held by the State.

The second measure considered is the number of inmates incarcerated differentiated by level of security. This measure expands on the preceding one by separately identifying the number of inmates assigned to each level of physical security. Security level means the degree of control exercised over the assigned inmates, that is, minimum, medium, and maximum. The reasons for identifying the inmates by security level is that resource requirements (costs and labor) vary by security level and the ratio of inmates assigned to the various security levels changes through time.

Conceptually, this measure is preferred over the simple count of incarcerated prisoners. That is, by differentiating the index the unit labor requirements spent in the production of different services is more accurately reflected. This measure satisfies the other evaluation criteria presented in chapter 2 equally well.

Security is paramount in correctional facility operations.[22] Security and order are maintained in prisons by controlling the movement of inmates, searching inmates and facilities, monitoring inmate assignments and performance, intervening in disputes among prisoners, staffing guard towers, and so forth. The 1990 Bureau of Justice Statistics employment data show that two-thirds of all employees are classified as security personnel,[23] a figure that has remained fairly constant through time. Five prison surveys between 1962 and 1990 show that the custodial employees make up 65-67 percent of all employment.[24]

Although security levels and definitions vary from State to State, the general concepts are universal. Three levels are used in this discussion—maximum, medium and minimum—following the lead of the Bureau of Justice Statistics:

Maximum security is for the most violent offenders. Security requirements are paramount. Facilities are closed to the outside world, and double fences are common. Inmate movement is limited within the facility, and inmate monitoring and control takes precedent over all other activities.

Medium security is the most difficult of the three levels to define. Generally, the inmates placed in medium security are thought worthy of rehabilitation and they are provided with intensive program services. But perimeter security and inmate control remain of paramount concern.

Minimum security is for the least violent offender. The facilities are relatively open, and inmate controls are built as much on trust as on physical control. Road and forestry camps and farms are examples of minimum security facilities.[25] Community facilities, such as halfway houses, normally contain only minimum security inmates.

As noted above, security classification is important for productivity measurement because the cost varies by type of confinement. In 1984, the operating cost per inmate in a maximum security prison was about $11,300 annually while the cost in a halfway house was about $8,000. There were 3.9 inmates per correctional officer in maximum security prisons, 4.0 in medium, 4.7 in minimum, and 6.1 in community facilities.[26] In 1990, the cost per State and Federal inmate in maximum confinement was $16,507, medium was $16,095 and minimum was $11,833. The cost per inmate in State operated community-based facilities was $9,709.[27]

The percent of inmates assigned to each security level has changed through time (table 45). The greatest growth occurred in medium security facilities that housed almost 48 percent of all inmates in 1990; in 1974, 34 percent were housed in medium security facilities.

Table 45. Percent of inmates assigned by facility security classification, selected years.

Security classification	1974	1979	1984	1990
Confinement facilities:				
Maximum	39.5	40.6	42.3	37.1
Medium	33.8	36.4	42.9	48.0
Minimum	21.9	19.0	11.4	12.4
Community facilities	4.8	4.1	3.4	2.6

SOURCE: **1974**: Computed from data presented in *1976 Sourcebook of Criminal Justice Statistics*, Washington: Government Printing Office, 1976, p. 244. **1979**: Computed from data presented in *1981 Sourcebook of Criminal Justice Statistics*, Washington: Government Printing Office, 1981, p. 141. **1984**: Computed from data presented in *1984 Census of State Adult Correctional Facilities*, Washington: U.S. Department of Justice, 1986, p. 6. **1990**: Computed from data presented in *Census of State and Federal Correctional Facilities, 1990*, Washington: Government Printing Office, pp. 9 and 20.

The custody level of the inmate usually, but not always, matches the physical security level of the facility to which the inmate is assigned. That is, maximum security prisoners are generally held in maximum security facilities. But on occasion, maximum security inmates can be held in a medium or even a minimum security facility. It is much more common for minimum security prisoners to be held in medium or maximum security prisons. Calculations require that inmates be differentiated by the physical security level rather than by custodial security level because data are not available with which to calculate weights by custodial security level.[28]

For productivity calculations, correctional institution output should differentiate inmates by the level of physical security provided and the output weighted by the appropriate base year unit labor requirement weights. To calculate facility output by security level, the preferred labor measure is the number of custodians or guards. However, because all employees are guards, to a certain extent, and the ratio of custodians to total employment seems to be fairly constant through time, it should be acceptable to use total employment when custodial data are unavailable.

The final measure of the three, inmates incarcerated with differentiated program service, incorporates services such as education, vocational training, counseling, recreation, library, and religion, into the basic measures discussed above. The reason for including program services in the basic measure is that about 15 percent of State correctional institution resources go to support program services, and the labor used and services provided may vary through time. This measure should provide additional insights into productivity movements because it further differentiates outputs.

Although data are lacking on the number of employees working in program services, the 1990 Bureau of Justice Statistics prison survey shows that professional, technical, and educational personnel accounted for 16.0 percent of U.S. State correctional facility staff. In 1984, it was 15.3 percent and in 1979, 15.1 percent.[29] A study of New York corrections calculated that program services consumed about 17 percent of that State's prison budget in fiscal 1978 (prison industry and recreation services were added to regular program services to reach this figure).[30]

Most, if not all, correctional institutions provide some program services. While separately identifying each service and including it in the output index would be useful, there are two problems with such an approach. First, no approach has yet been developed to measure outputs for many program services such as education and recreation. Second, the necessary data are lacking to make the measurements, even in those cases where there is a reasonable idea of what to measure.

Where there are proxy or surrogate measures and measurement data, the available statistics suggest that program service outputs and inputs have increased at about the same rate. Thus, there is no real reason to include, and several reasons to exclude, program services from overall measurements. Furthermore, it is unlikely that any measurements would substantially affect an index of State correctional output, even if they could be included at this time.

Crowding is a special concern and a perennial problem in correctional institutions. It was discussed in the first annual report on State prisons in 1926, which noted that correctional facilities were operating at 108 percent of capacity.[31] The 1990 Bureau of Justice Statistics survey notes that facility crowding ranged from 101 percent to 122 percent, depending on the capacity measure used. In June 1990, 172 of the 1,207 State correctional facilities were operating under a court order or consent decree to limit the number of inmates because of crowding.[32]

Crowding impacts many facets of prison operations. The concern here is how productivity is affected when more and more inmates are crowded into a facility? Some argue staffing is not increased proportionally.[33] That is, labor productivity would increase as inmates are crowded into a facility. Most research suggests otherwise. Generally, staff increases seem to parallel inmate growth. To quote one report:

> There is some evidence that correctional systems may respond to pressures of population growth by increasing the level of supervision over inmates. Total staff increases nationally in State prisons between 1979 and 1984 were identical to the increase in the number of inmates (45 percent); however, since most of the personnel increase over the period was among correctional officers, the number of inmates per officer actually dropped from 4.6 to 4.1.[34]

Apparently, the individual facility unit labor cost curve decreases as long as the number of inmates is less than its design capacity and remains constant once the design capacity is reached. Because most facilities operate at and beyond capacity, a flat unit labor cost curve becomes evident. Institutional considerations such as budget constraints, court rulings, press reports, and security concerns apparently serve to put an upper bound on facility crowding.

Furthermore, some studies conclude that facility crowding has a generally negative affect on institutional suicides and assaults. Other studies conclude that suicides and assaults do not vary with increasing population but because of more important factors.

To quote:

> When density levels are compared with equivalent security grades, no clear pattern emerges. The highest density maximum security facilities, for example, evidenced the highest rate of suicide but had a rate of homicide lower than that reported in moderate density prisons and about the same as that in low density prisons. Moreover, for prisons of each security level, inmate-on-inmate assaults were most prevalent in the lowest density prisons. Similarly, institutional disturbances in minimum and medium security facilities were most prevalent in prisons with the lowest population densities. In general, no consistent pattern emerges from these data indicating that the incidence or prevalence of these negative events increases with greater population densities.[35]

In short, the evidence and research on prison crowding is mixed, and suggests no reason for explicitly considering prison crowding in prison output and productivity indexes.

Summary of output measures. The preferred conceptual measure of adult correctional facility output is the number of inmates weighted by the type of prisoner and the type of treatment provided. Unfortunately, data are lacking to develop even the simplest treatment modalities. This effectively restricts the calculations presented here to two output measures. The first measure is a count of the number of inmates in State correctional institutions. The second is a count of the number of inmates differentiated by the level of facility security. The next two sections of this paper present calculations for these two measures.

Inmates incarcerated: An undifferentiated output series

The undifferentiated output measure is the number of inmates held. Although this measure is straightforward, there are several conceptual and data problems. As discussed earlier, there is the issue of whether to use an average daily or a year-end count. The average daily count is generally preferred for conceptual reasons, but data are lacking with which to compute such an index. Thus, the year-end count is used in the measure.

Another issue is whether to count the number of persons under the jurisdiction of the State or the number held in State facilities. As discussed earlier, for productivity purposes, the measure should count all inmates housed, irrespective of the circumstances under which they are held. While the concept is simple, the problem, once again, is data availability. Custodial data are not readily available prior to 1977. Prior to 1977, the prisoner data are for felons under State jurisdiction.[36]

Examination of the custodial and jurisdictional series shows that they increase at about the same rate, at least for the years for which comparable data are available. The change from 1977-86 showed a similar but not identical movement. Thus, for trend measurement purposes it does not make much difference whether a jurisdictional or custodial index is used; level estimates present a different situation. It is important that the same data series is used throughout the measured period or, if not, that the data series are linked when shifts are made between data series.[37]

Table 46 presents the undifferentiated output series and index. Given the issues just discussed, the index is constructed using a year-end jurisdictional count for 1973-77 linked to the custodial index for 1977 forward.

Inmates incarcerated: A security differentiated output series

A better measure of prison output for productivity measurement purposes is the number of inmates differentiated by facility security level (maximum, medium, and minimum). In addition, community facilities are separately identified because they have very different unit costs. Community facilities are those where more than half of the residents regularly leave, unaccompanied, for work, study, school, or other activities. Community facilities are often described as half-way houses and generally house only minimum security inmates.

Table 46. State adult institution inmate indexes, 1973-92

Year	Felons, year end	Felon index (1973=100)	Custody year end	Custody index (1977=100)	Linked inmate index (1973=100)
1973	181,396	100.0			100.0
1974	196,105	108.1			108.1
1975	216,462	119.3			119.3
1976	235,853	130.0			130.0
1977	247,507	136.4	258,643	100.0	136.4
1978			269,765	104.3	142.3
1979			281,233	108.7	148.4
1980			295,819	114.4	156.1
1981			333,251	128.8	175.8
1982			375,603	145.2	198.1
1983			394,953	152.7	208.4
1984			417,682	161.5	220.3
1985			451,812	174.7	238.4
1986			486,655	188.2	256.7
1987			520,336	201.2	274.5
1988			562,605	217.5	296.8
1989			629,995	243.6	332.4
1990			684,406	264.6	361.1
1991			728,605	281.7	384.4
1992			779,134	301.2	411.0
Average annual rate of change:					
1973-77					8.1
1977-92					7.6
1973-92					7.7

SOURCE: *Historical Statistics on Prisoners in State and Federal Institutions, 1925-86*, table 1, p. 12, and *Correctional Population in the United States*, table 5.18, selected years

The security-differentiated indexes were constructed using the inmate series discussed in the preceding section and inmate security data collected in the Bureau of Justice Statistics surveys conducted for 1973, 1979, 1984, and 1990. Inmate security data are not available prior to 1973. Separate indexes were constructed for each security level (table 47).

Annual growth rates of the inmate population produced by the calculations for the various security levels are shown in the tabulation.

Maximum security	7.4
Medium security	9.7
Minimum security	4.5
Community security	4.3

All statistics are compounded and cover the 1973-92 period (table 47).

A security-differentiated index was calculated using these data. Separate segments were calculated for 1973-79, 1979-84, 1984-90, and 1990-92 using the unit labor requirements, and the individual segments were combined using labor weights to create a single index.

The unit labor weights used to combine the segments are presented in table 48. In each instance they reflect the number of inmates divided by the number of custodial personnel (e.g., guards). As table 48 shows, weights increase through time for each security level except for minimum security in 1979. The reason for the drop in 1979 is not known; it is possible that the problem is 1973, not 1979.

Table 47. Unweighted output indexes by security level, 1973-92
(1973=100)

Year	Maximum	Medium	Minimum	Community
1973	100.0	100.0	100.0	100.0
1974	108.6	109.4	105.7	105.5
1975	120.5	122.3	114.0	113.5
1976	131.9	134.8	121.2	120.5
1977	139.1	143.2	124.2	123.1
1978	145.8	151.1	126.3	125.0
1979	152.7	159.3	128.3	126.7
1980	162.0	173.6	124.2	128.7
1981	184.0	202.4	127.9	139.8
1982	209.1	235.7	130.5	151.8
1983	221.6	255.9	122.9	153.5
1984	236.3	279.1	114.9	155.9
1985	250.3	307.9	126.0	162.2
1986	263.9	338.1	137.6	167.7
1987	276.0	368.4	149.1	171.8
1988	291.8	405.7	163.4	177.7
1989	319.4	462.7	185.4	189.9
1990	339.0	511.7	204.0	196.5
1991	360.9	544.7	217.2	209.2
1992	385.9	582.5	232.3	223.7
Average annual rate of change:				
1973-92	7.4	9.7	4.5	4.3

Comparison of the output indexes

The preferred conceptual output measure is the number of inmates incarcerated differentiated by security level and program service. Unfortunately, data are lacking (and in some instances the necessary theory) to differentiate program services.

Thus, the indicator used to measure adult correctional institution outputs is the number of inmates incarcerated differentiated by security level. Because of data limitations, it is impossible to differentiate the index prior to 1973, thus the index covers only 1973-92.

The average annual increase in output between 1973 and 1992 was 7.8 percent, and there were increases every year (table 49). As noted earlier, the average annual increase by security classification varied from 9.7 to 4.3 percent (table 47). The unweighted index, which is also shown in table 49, increased at almost the same average annual rate (7.7 percent) as the weighted index.

Table 48. Unit labor requirement weights by facility-security level for State government adult institutions, selected years

Security level	1973	1979	1984	1990
Confinement facility:				
Maximum	.213	.216	.252	.267
Medium	.209	.232	.240	.243
Minimum	.191	.190	.208	.210
Community facility	.158	.161	.163	.197

SOURCE: **1973**: Calculated from data taken from a special computer run of BJS census data collected in 1974. **1979**: Calculated from data taken from a special computer run of BJS census data collected in 1979. **1984**: Calculated from data taken from *1984 Census of Adult Correctional Facilities*, Washington: U.S. Bureau of Justice Statistics, 1986, p. 7. **1990**: Calculated from data taken from *Census of State and Federal Correctional Facilities, 1990*, Washington: U.S. Government Printing Office, May, 1992, p. 20 and data provided by Jim Stephen, BJS, September 9, 1992.

Table 49. Comparison of two State adult correctional output indexes, 1973-92
(1973 = 100)

Year	Unweighted	Security weighted
1973	100.0	100.0
1974	108.1	108.2
1975	119.3	119.5
1976	130.0	130.3
1977	136.4	136.9
1978	142.3	142.9
1979	148.4	149.0
1980	156.1	157.3
1981	175.8	177.7
1982	198.1	200.9
1983	208.4	212.0
1984	220.3	224.9
1985	238.4	243.2
1986	256.7	261.9
1987	274.5	279.9
1988	296.8	302.6
1989	332.4	338.7
1990	361.1	367.9
1991	384.4	391.6
1992	411.0	418.8
Average annual rate of change: 1973-92	7.7	7.8

Labor inputs

There were about 250,000 adult institutional employees in State governments in 1990, up from less than 50,000 in 1965. The number of employees is a relatively good indicator of the resources expended on State prison operations because about 75 percent of all prison operating expenditures go to compensate prison employees. Furthermore, an index of prison employment is a good indicator of how the use of prison resources changes through time.

Custodial employees or guards account for about two-thirds of the prison labor force, a statistic that has remained relatively constant through time (table 50). In 1984, educational and treatment personnel including teachers, social workers, doctors, dentists, nurses, psychiatrists, and psychologists made up another 16 percent. Maintenance and food service workers accounted for almost 8 percent, clerical workers about 7 percent, and administrative personnel about 4 percent.

Prison employment is 80 percent male as are the inmates, but the male-female ratio varies by occupation or function. The guard or custodial occupation is 88 percent male, the administrative staff is 82 percent male and the treatment/educational staff is 67 percent male. The clerical staff, on the other hand, is only 16 percent male.[38]

Most State adult prison employees are full-time employees. The criminal justice dimensions of the job, such as the requirement for staff security clearances, for around the clock operations, and for specialized job training, dictate that full-time employees be used in most instances. Almost 98 percent of all State prison employees work full time. The figure for guards, maintenance, and food service personnel is 99 percent; for treatment and education it is 92 percent; and for medical it is 85 percent. By comparison, the figure for all State government employees is 75 percent.[39]

Two labor indexes, full-time-equivalent and total employment, are normally calculated for government productivity indexes. The two indexes often move in concert, and this should be the case for prisons because most employees are full-time employees. The labor index reflects the number of full-time-equivalent employees.

Table 50. State government correctional institution employment by occupation, 1962, 1965, 1974, 1979 and 1984

Occupation	1962	1965	1974	1979	1984
Total	42,721	46,680	60,604	95,724	141,958
Custodial	27,715	30,809	39,298	59,383	94,601
Guards	26,966	30,809	38,157	59,383	94,601
Wardens[1]	749		1,141		
Treatment and education	3,061	3,137[2]	6,319	14,492	21,678
Teachers	1,457	1,654	2,851	9,444	13,405
Social workers	525	1,124	1,341		
Psychologists	158		365	482	
Psychiatrists	96		181	169	1,289
Doctors	517	306[3]	614	933	
Nurses	308	327	967		
Other medical		327		3,464	
Combined medical			6,993		
Other	11,945	12,734	14,987	21,849	25,670

[1]Wardens not identified separately each year.
[2]Data in subcategories do not add to total.
[3]Includes physicians, psychiatrists, and dentists.

SOURCE: **1962**—*National Manpower Survey of the Criminal Justice System,* Volume 3, *Corrections*, Washington: U.S. Law Enforcement Administration Agency, September, 1978, p. 15; as taken from U.S. Bureau of Prisons Statistics. **1965**—U.S. President's Commission of Law Enforcement and Administration of Justice, *Task Force Report: Corrections*, Washington: Government Printing Office, 1967, p. 180. **1974**—*National Manpower Survey of the Criminal Justice System,* Volume 3, *Corrections*, Washington: U.S. Law Enforcement Administration Agency, September, 1978, p. 15; as taken from 1974 special survey of State Adult Prisons. **1979**—U.S. Bureau of Justice Statistics, "Census of State Adult Corrections Facilities, 1979," Ann Arbor, Michigan: Inter-University Consortium of Political and Social Research. Unpublished data taken from survey documentation. **1984**—*1984 Census of State Adult Correction Facilities*, NCJ-105585, Washington: U.S. Bureau of Justice Statistics, August 1987, and unpublished data taken from survey documentation.

There is no annual data series on State adult institutional employment. The procedure used to estimate State prison employment is to benchmark the year-to-year change in State correctional employment as shown in the annual Census of Government. The benchmarks are taken from the Presidential Commission on Law Enforcement statistics for 1965 and the Bureau of Justice Statistics survey data for 1979, 1984, and 1990. Comparison of Census and benchmark data show that for 1965-1979 the two measures increased at about the same rate (less than 2 percent difference over the 14 years). Over the 1979-84 period, the Bureau of Justice Statistics measurements increased about 9 percent more than the Census data as they did over the 1984-90 period. The benchmark data include personnel paid by other State government agencies, such as departments of education and health, but who work in prisons. The Census data probably exclude these employees. These employees are less than 3 percent of total prison employment, a figure that has been consistent over the years. Thus, it should not affect labor trends.

The average annual increase in State correction employment as calculated by the Bureau of Census, and State adult institutional employment as estimated for this study, are shown in table 51. The average annual increase in the Census data between 1967 and 1992 is 6.2 percent. The estimated increase in State adult institutions is 7.3 percent. For 1973-92, the period covered by the output and productivity indexes, the average annual increase is 7.8 percent.

Table 51. Comparison of State correctional employment and State adult correctional institutional employment indexes, 1967-92.
(1967 = 100)

Year	Corrections employment	Adult institutional employment
1967	100.0	100.0
1968	104.2	104.1
1969	109.9	109.6
1970	118.0	117.5
1971	126.3	125.7
1972	134.1	133.3
1973	140.5	139.5
1974	150.0	148.7
1975	154.5	153.0
1976	166.5	164.7
1977	176.9	174.8
1978	182.8	180.4
1979	196.7	193.9
1980	198.0	198.9
1981	219.7	224.7
1982	239.9	249.8
1983	254.5	269.7
1984	280.4	302.2
1985	300.4	328.8
1986	317.8	353.1
1987	343.3	387.0
1988	371.4	424.8
1989	398.5	462.4
1990	428.5	504.1
1991	441.3	538.4
1992	453.5	577.1
Average annual rate of change		
1967-92	6.2	7.3
1973-92	6.4	7.8

NOTE: Adult institutional employment calculated using annual Census data and Bureau of Justice Statistics benchmarks. See text for discussion of procedures.

SOURCE: Corrections employment calculated from annual issues of *Public Employment (Bureau of the Census)*

Productivity indexes

State adult correctional labor productivity as measured by output per employee, was essentially flat between 1973 and 1992. Between 1973 and 1982 it increased 1.3 percent on an annual average basis as output growth outstripped labor. Over the next decade, 1982-92, it decreased by 1.0 percent on an annual average basis. Both output and labor input increased rapidly, although at different rates, throughout the measured period (table 52).

Table 52. State government adult correctional institution productivity indexes, 1973-92
(1970 = 100)

Year	Output index	Labor index	Productivity index
1973	100.0	100.0	100.0
1974	108.2	106.6	101.5
1975	119.5	109.7	109.0
1976	130.3	118.1	110.4
1977	136.9	125.3	109.2
1978	142.9	129.3	110.5
1979	149.0	139.0	107.2
1980	157.3	142.6	110.3
1981	177.7	161.1	110.3
1982	200.9	179.1	112.2
1983	212.0	193.3	109.6
1984	224.9	216.7	103.8
1985	243.2	235.7	103.2
1986	261.9	253.1	103.5
1987	279.9	277.4	100.9
1988	302.6	304.5	99.4
1989	338.7	331.4	102.2
1990	367.9	361.3	101.8
1991	391.6	385.9	101.5
1992	418.8	413.7	101.2
Average annual rate of change:			
1973-92	7.8	7.8	0.1
1973-82	8.1	6.7	1.3
1982-92	7.6	8.7	-1.0
1973-79	6.9	5.6	1.2
1979-84	8.6	9.3	-.6
1984-90	8.6	8.9	-.3
1990-92	6.7	7.0	-.3

Local Jails

Jails and prisons are often treated and discussed as if they were the same, and in many ways they are similar. Both hold prisoners, both have grown dramatically over the past three decades, both report on their operations, and both share the same standard industrial classification system number.

But, in many respects, the two institutions are very different. Jails hold convicted persons and those awaiting trial while prisons hold only convicted persons. Jail inmates serve shorter sentences (usually less than 1 year) than prison inmates. Jails are usually located in cities while prisons tend to be located in rural areas. Jails tend to be smaller than prisons and offer far fewer treatment and education programs.[40]

Institutional setting

Local governments spent almost $6.9 billion to operate their jails in 1993; the cost per prisoner per year was about $14,700. In addition to operating costs, local governments spent another $2.8 billion on capital costs to add to and modernize their jails the same year.[41]

Many more individuals are sent to jail each year than to State prisons although the number of persons confined to prison at any point in time is much larger than those in jail. Jails are used for short-term detention and confinement and as a result have a high turnover of persons compared to prisons. About half of those in jail are awaiting trial while the rest are serving sentences or are being held for other jurisdictions.

The number of inmates in jails has increased over the years, as the number of jails has decreased.

Year	Average number of inmates	Number of jails
1970	40	4,037
1978	45	3,493
1983	67	3,338
1988	104	3,316
1993	139	3,304

The decrease in the number of jails is largely the result of consolidations and a search for greater efficiency in operations. Yet, even in 1993, over half of the Nation's jails had 50 or fewer inmates.[42]

There is some question as to what constitutes a jail. As the term is used here, a jail is a facility that holds inmates beyond arraignment, usually for more than 48 hours, and is operated by local government employees. Jails are sometimes known as detention centers, county prisons, workhouses, or houses of correction. Specifically excluded from the definition are temporary lockups that house individuals for less than 48 hours, Federal and State operated facilities, and privately operated facilities. The definition used here is the one used by BJS in its data collection instruments.

Local governments operate most, but not all, jails. Alaska, Connecticut, Delaware, Hawaii, Rhode Island, Vermont, and the District of Columbia operate unified systems, that is, combined jail and prison systems. As noted in the discussion of State prisons, statistics on these facilities are included in adult institutional tabulations.[43]

Also, some jurisdictions have turned to private companies to operate their jails. The private sector has long been a source of supplies and services for jails, but it is only recently that it has taken over the operation of entire facilities. The difficulty in constructing new jails, rising incarceration costs, and the use of "privatization" in other public services, has generated interest in privatizing jail operations. And while there is considerable discussion of the concept, only 17 jails were privately operated under contract to local governments in 1993.[44]

Sheriffs operate the majority of the jails in the United States, 85 percent in the early 1980s according to one count. However, correctional administrators or wardens operate jails in most large cities and some counties in Pennsylvania. Also, elected jailers operate jails in Kentucky, and jail administrators are appointed in New Jersey.[45]

Labor is a good measure of the resources used in jail operations because it accounts for the major portion of jail operating expenditures, by one account 78 percent.[46] A study in Washington State found labor costs to be 76 percent of total jail expenditures, supplies 15 percent, purchased services 8 percent, and capital 1 percent.[47] The same study found that the percent of expenditures devoted to personnel ranged from a high of 94 percent in one jurisdiction to a low of 40 percent in another.

The productivity measurements covered in this section include jail operations in most States as specified by SIC 9223, correctional institutions:

> Government establishments primarily engaged in the confinement and correction of offenders sentenced by a court. Private establishments primarily engaged in the confinement and correction of offenders sentenced by a court are classified in Services, industry 8744. Half-way houses for ex-convicts and homes for delinquents are classified in Services, industry 8361.
>
> Correctional institutions
> Detention centers
> Honor camps
> Houses of correction
> Jails[48]
> Penitentiaries
> Prison farms
> Prisons
> Reformatories

State prisons, penitentiaries, reformatories, and jail operations of six States and the District of Columbia that were included in the preceding section are not covered here.

Also, juvenile facilities and probation and parole activities are excluded from this section. Hence, only part of SIC 9223 is included in the indexes presented here.

Precise statistics are lacking as to what part of SIC 9223 resources go to support State prison operations and what part goes to local jails. An estimate for 1990 suggests, however, that operating costs were about 67 percent for State prisons and 33 percent for local jails. The employment ratios are about the same, 65 percent in State prisons and 35 in percent local jails.[49]

One observer noted in 1975 that accurate national data on jail operations were not readily available because most jails were run by local authorities, kept inadequate records on their operations, and most had no requirement to report to a central authority.[50] Since this observation was originally made, largely as a result of Bureau of Justice Statistics efforts, the data situation has improved markedly. But there are still major gaps in the data and very little research on jail operations, at least when compared with prisons. Furthermore, data consistency is a real problem in formulating a long-term local government jail productivity index.

Outputs

A search of the literature found little analysis or even discussion of how to measure jail services or outputs.[51] This section reviews some of the measures that have been used for jail services, identifies the preferred measures, and calculates an output index.

Candidate measures

Six measures which have been used or suggested for use are considered here: Inmates confined, inmates confined by detention status, average daily population (ADP), admissions and releases, number of confinement units or beds, and program services. Most are surrogate measures for the work performed. The following section briefly discusses each in terms of their strengths and weaknesses, using the criteria presented in chapter 2.

Inmates confined. Probably the most frequently cited and used measure of jail output is a count of the number of inmates held. Here it is used as a proxy for the work performed, that is, the greater the number of inmates the more work performed. The measure is sometimes broken down by sex, age (juvenile-adult), and inmate status (pretrial, convicted and/or awaiting sentencing, and serving sentence). This measure meets most of the output evaluation criteria listed in chapter 2, that is, it is measurable, repetitive, and understandable. However, no statistics were found that showed the relationship between output and the resource units spent in their production although simple calculations show a good correlation between the number of inmates and the number of jail employees.

Although there are problems in using the inmate count as a measure of jail output, the actual counts should be extremely accurate since physical counts of the number of inmates are usually taken several times each day.

Inmates confined by detention status. A variation of the inmate count is a count differentiated by type of detention. For State prisons, inmates were categorized by security level, that is, maximum, medium, minimum, and community detention, because research shows that resource requirements vary by level. No comparable research was found in the case of jails.

There are several different ways to categorize jails and jail inmates. One is by the type of security such as that used in State prisons. Another is by type of inmate status: Awaiting arraignment, convicted and awaiting sentencing, serving sentence, and technical probation and/or parole violation. Apparently, no one has yet determined how to differentiate inmate counts by type of prisoner for productivity calculations and, until that is done, further research on this measure cannot proceed.

Average daily population (ADP). This measure is commonly calculated and widely used. It is a better measure than the 1-day inmate count when assessing output over an extended period, such as a month or year, because it captures the change through time.

The measure meets most of the evaluation criteria noted above. A 1976 statistical study of 60 jails in California found that the ADP accounted for about 80 percent of the total variation in annual operating cost.[52]

While ADP is commonly used, there, apparently, is no commonly agreed upon calculation procedure. Is the count taken every day and averaged? Is the count taken at 6 p.m., 12 midnight or 6 a.m. and considered the "daily" population for that day? Or is the ADP a simple average of the beginning and ending period such as 1 year? There are a host of possible definitions and measurement technicalities. Early surveys did not specify the procedure for calculating the ADP but left it up to the reporting jurisdiction. More recent Bureau of Justice Statistics surveys have asked reporting jurisdictions to sum the daily counts and divide by 365.

Admissions and releases. The number of jail admissions and releases greatly exceeds the number of prisoners which is the opposite of the State prison situation where the number of prisoners held exceeds the number of admissions. Bureau of Justice Statistics' jail data for 1993 show a ratio of 1:28 (number of admissions/average daily population), or 28 admissions for each inmate.[53]

The concern about admissions and releases is that they generate additional work that affects productivity. The work of admissions and releases includes documentation of prisoner history, prisoner interview, physical examination of the inmate, storage of personal effects, issuance and take back of jail clothing, movement of the prisoner, and so forth. The work and time that is associated with each admission and release may be small in absolute terms but for all inmates it may be important. More importantly, the time spent on each prisoner may change through time, that is, the unit resource requirement may change. Also, the ratio between the number of admissions and the number of inmates may change through time. Each of these considerations can affect productivity trend calculations.

Examination of the readily available data suggests that admissions decreased as a percent of the total number of inmates between 1983 and 1993. However, there is not a great deal of difference between the data for 1988 and those for 1993. In 1983 there were 36 admissions for each ADP inmate, in 1988 there were 29 and in 1993, as noted above, there were 28.[54]

Given the large number of admissions to and releases from the Nation's jails each year and the apparent decrease in the number of admissions and releases compared with the number of inmates, the work associated with admissions and releases probably should be identified and counted separately. However, no studies were found that would suggest, in quantitative terms, the importance of this activity in terms of the resources expended. Nor is it evident how one would calculate resource weights for this activity, nor was any proxy measure found that could be used in lieu of resource weights. The Bureau of Justice Statistics collects data periodically on the number of admissions and releases in the Nation's jails, but without estimates of the resources devoted to this activity it is impossible to calculate an output index for it.

Number of confinement units and/or number of beds. Two other measures that are used in measuring jail services, and for which data are often collected, are the number of beds and the number of confinement units. The concept of a bed is simple, but a confinement unit can be anything from a single cell that can hold one person to a drunk-tank which can contain several hundred inmates. At one extreme a jail could have 100 beds and 1 inmate, at the other it could have 1 bed and 100 inmates with 99 inmates sleeping on the floor.

Both measures are important in calculating crowding and planning for future facilities, and the courts have expressed an interest in both statistics. But they are measures of capacity not output nor the work of a jail. Neither of these measures is appropriate for measuring jail productivity.

Program services. Program services such as academic and vocational training, recreation, counseling, religious services, and so forth are provided by some jails. While they are not the only measure of jail output, they should be considered in preparing any productivity index because they *can* consume scarce resources.

Jail surveys have found, however, that program services are not very important, at least in terms of total resources expended. One survey found that less than 15 percent of the Nation's jails provided any type of adult education program. About half had some type of work release program but only 6 percent of the inmates participated; and recreation, while fairly common, usually took the form of unsupervised exercise. In short, there are very few program services provided in the Nation's jails, and there are few employees to provide such services.[55]

Also, measurement of program service output raises numerous conceptual issues, and data with which to make such calculations for the Nation's jails are missing. Hence, this measure cannot be used to develop a jail output measure.

Quality

Has the quality of local jails changed through time in such a way that it has affected productivity? Unfortunately, there is little agreement on what constitutes jail quality and how it should be measured. Generally, when discussing jail quality, the focus usually is on space per inmate, cleanliness of the facility, recreational opportunities, food quality, and so forth.

Some might argue that jail quality has improved through time given court imposed actions, court appointed monitors, and development of jail standards. Many States now inspect local jails on a regular schedule and a few States have enforcement powers. On the other hand, crowding is now an issue in many jails where it wasn't a few years ago. Even when there is agreement on what constitutes adequate quality, there is little data on which to make an assessment.

Given the conceptual arguments, the absence of hard analytical evidence, and the lack of data, the issue of quality will not be pursued further in this bulletin, except for crowding.

Crowding—A special concern

Crowding is a problem for many jails as it is for many prisons. The basic problem is the same, too many inmates and not enough space, but the underlying conditions and variables are quite different.

First, jail crowding is a recent phenomenon, at least for most institutions, while prison crowding is a long-standing problem. Second, fluctuations in the number of prisoners held in jails are much greater than for those held in prison. Jail prisoner fluctuations require more reserve capacity to handle the peaks and valleys. Third, there is greater variability in crowding from jail-to-jail than there is from prison-to-prison. This is the result of the location, number, and function of jails as contrasted with State prisons. State prisons are better able to balance their workload because of the long-term internment of prisoners and the greater number of facilities. In many local jurisdictions there is only a single jail. Also, the large jails, which are located in the major metropolitan areas, are generally filled, while those in rural areas often have excess capacity.

In 1983, jails in the United States operated at 85 percent capacity. Jails with a capacity of 50 or fewer inmates had an occupancy rate of 52 percent; those with a capacity of 50-249 had an occupancy rate of 86 percent; and those with a capacity of 1,000 or more had an occupancy rate of 121 percent.[56]

In 1988, jails in the U.S. operated at 101 percent capacity. However, jails with an average daily population of 1,000 or more inmates operated at 126 percent of capacity. A total of 404 jails were under court order in 1988 to limit the number of inmates they held.[57]

In 1993, jail capacity was measured at 97 percent, a drop from previous years. Crowding at facilities with 1,000 or more inmates dropped to 111 percent of rated capacity. But the statistics varied dramatically by State. Virginia's jails were rated at 160 percent of capacity while North Dakota's held only 43 percent of their capacity.[58]

Jail crowding generates the need for more staff, and exerts greater wear and tear on facilities. It also fuels prisoner tensions. In short, it magnifies operating problems.[59] Crowding also affects other parts of the criminal justice system and the community as a whole. Early and emergency release of inmates is common. Nineteen States reported early release of prisoners in 1985 because of overcrowding.

How does productivity change when more and more prisoners are crowded into a jail? The primary evidence for crowding comes from studies of prisons. Available research suggests that crowding of prisoners leads to more than a proportional increase in the number of guards. Hence, the conclusion is that crowding probably reduces labor productivity if it has any affect at all.[60]

In the case of jails, the available evidence is skimpy. One study found that as jail size and density increased, the number of inmates per staff has also increased. The same study also found an inverse relationship between inmate density and the number of suicides.[61]

Since jail crowding is a recent phenomenon nationally, there is little information on how it affects jail productivity. The available information does not indicate a deleterious affect on quality, however, and no adjustments will be made for jail crowding in the jail productivity index.

Recidivism and other outcome measures

The outcomes or results of jail operations, such as the recidivism rate, the number of individuals appearing or failing to appear for trial, and community safety, fall outside the scope of this study.

Inmates confined

This section presents an output index for local jails. The ideal measure would capture the work involved in admission and release processing, housekeeping and security chores, and program services. But data limitations restrict the measure to a single, proxy output—the number of inmates confined. Computation of even this simple measure is difficult, as several issues come into play.

First, there are two basic types of inmate measures, average daily population (ADP) and one-time counts. Each has its strengths and weakness. The average daily population count is a better measure when examining annual resource expenditures because it captures change through time in the number of inmates and it is not affected by extraordinary events that may affect a one-time or 1-day count. On the other hand, a one-time count is helpful in capturing certain types of data, such as detention status, that are not usually available for an ADP count. For long-term trend computations there should not be a great difference between the two measures. The Bureau of Justice Statistics censuses of jail inmates in 1983 and 1993 show a 1-day count increase of 105.7 percent while the ADP count registers a 104.9 percent increase.

The 1-day count is used here to measure jail output for two reasons. First, the ADP is not available prior to 1983 and second, the employee counts used in the labor benchmark calculations are 1-day counts.

Regardless of the type of inmate count used, it is important to include all inmates held, not just those under the jurisdiction of the government operating the jail. This is because local jails often hold inmates for other governments, including Federal and State governments. The National Sheriffs' Association survey of 1981 showed half the jails holding non-jurisdictional prisoners. The 1988 Census of Jails found that about 12 percent of all jail inmates were being held for other governments.[62]

The Federal Government has long used local government jails to house Federal inmates awaiting legal "disposition." In 1987, 69 percent of the 85,348 individuals held under the custody of the U.S. Marshals Service were housed in State and local facilities.[63] State governments also rely on local governments to alleviate prison overcrowding. In 1988, 16 States reported housing 12,200 prisoners in local jails because of crowding.[64] For productivity measurement, it is important to focus on the total inmate population when counting the number of inmates, not just those under the jurisdiction of the holding government, because labor inputs support total jail operations.

The output index calculated and presented here for local government jails is an unweighted index of the number of inmates as of June 30 for the years for which reliable data are available: 1970, 1978, and 1982 through 1993.

The 1982-93 series reflects the annual estimates published by the Bureau of Justice Statistics of the number of inmates as of June 30 each year. These data are based on a sample of the Nation's jails, except in 1983, 1988 and 1993 when they are based on a complete census. The sample data reflect data on all jails with an inmate population of 100 or more and a stratified random sample of jurisdictions with an inmate population of fewer than 100 (table 53).

Table 53. Local government jail inmate index, 1970, 1978, and 1982-93
(1970 = 100)

Year	Number of inmates	Index
1970	160,812	100.0
1978	162,782	101.2
1982	209,582	130.3
1983	223,551	139.0
1984	234,500	145.8
1985	256,615	159.6
1986	274,444	170.7
1987	295,873	184.0
1988	343,569	213.6
1989	395,553	246.0
1990	405,320	252.0
1991	426,479	265.2
1992	444,584	276.5
1993	459,804	285.9
Average annual percent change:		
1970-93		4.7
1970-92		4.7
1970-78		.2
1978-82		6.5
1982-92		7.8
1982-93		7.4

The local jail output index shows a long-term average annual increase of 4.7 percent. Between 1970 and 1978 there was little change. But, beginning with the late 1970s and early 1980s there was rapid increase, and from 1982 through 1993 the average annual increase was 7.4 percent. By 1993, there were about 460,000 inmates in 3,300 local government operated facilities.

Labor inputs

There were almost 165,500 local government jail employees in 1993.[65] Those States with the greatest number of inmates—California, Texas, Florida, and New York—have the greatest number of jail employees.

The number of employees is a relatively good indicator of the resources expended on local jail operations because 70 to 80 percent of all jail operating expenditures go for compensation as noted earlier. Furthermore, an index of jail employment seems to be a reasonably good indicator of how jail resources change through time.

Custodial employees, or guards, comprise most jail employment, 71 percent in 1993. The other major labor force occupational groups are clerical and maintenance (13 percent), professional and technical such as doctors, nurses, and psychologists (7 percent), administrative (6 percent), and education and other (2 percent).[66] This occupational

breakdown has remained fairly constant over the 1970-93 period.

Most jail employees (94 percent in 1988) work full time. As with prisons, the criminal justice dimensions of the job, such as the requirement for staff security clearances, for round-the-clock operations, and for specialized job training, dictate that full-time employees be used in most instances. But the percent of employees who were full time varies by occupation. For guards it was 96 percent and for clerical and maintenance workers it was 92 percent. For professional and technical workers, however, it was 78 percent and for education it was 60 percent. The majority of jail employees (73 percent) are male.[67]

Two labor indexes, FTE employees and total employment, should be calculated for government productivity calculations. Because of data limitations, only one, total employment, is calculated for jails. The two indexes usually move in concert, and this should also be the case for jails because of the large number of full-time employees.

Calculating a jail labor index can be difficult. No national annual series of jail employment exists. Furthermore, there is a real question as to how many individuals work in local jails. Jails, in contrast to prisons, have many employees who perform multiple jobs, some outside the jail. In some of the smaller jurisdictions, for example, police may perform jail duties. However, in the larger city jails, a separate department is usually responsible for jail operations and the police are not directly involved.

Most inmates are held in county jails that are operated by an elected sheriff. In such cases, deputy sheriffs or marshals work in the jails, but they may also be responsible for court security, serving warrants, and even routine law enforcement activities like patrol and answering calls for service. A 1990 survey of sheriff's departments found that jail responsibilities consumed at least a third of the employees' work hours in 40 percent of the departments. "About 87 percent of the departments performed some jail-related work."[68]

The local jail employment index presented here is derived from two basic sources. The first is the local government correctional employment data series that is prepared annually by the U.S. Bureau of Census. Jail employees comprise about two-thirds of this series. The other basic source is the periodic survey sponsored by the Bureau of Justice Statistics and its predecessor organizations. These surveys, which were conducted for 1970, 1978, 1983, 1988, and 1993, are used to benchmark the Bureau of Census local government corrections employment series. The Bureau of Census and Bureau of Justice Statistics data were used to calculate four separate jail employment indexes: 1970-78, 1978-83, 1983-88, and 1988-93.

The 1970-78 index reflects the year-to-year change in local government correctional employees. These data were benchmarked to the 1970 and 1978 Bureau of Justice Statistics jail surveys with several minor adjustments. That is, adjustments were made to the data so that the Census and Justice survey dates matched, and the jail employees for Hawaii and Vermont were removed from the totals because inmates of these States were not included in the outputs.

The 1978-83 index is not benchmarked. Rather, it reflects the year-to-year change in the Census of Governments local government correctional employment series for 1978-83. This approach was taken because the Bureau of Justice Statistics jail employment data collection questions were modified in 1983, and there are questions as to how these changes affected the respondents' answers. This is the most questionable part of the index.

The 1983-88 and 1988-93 local government correctional data were benchmarked to Bureau of Justice Statistics local jail survey results. The benchmark data were taken from Bureau of Justice Statistics sponsored censuses that were conducted as of June 30, 1983, 1988, and 1993. Each survey collected the number of full- and part-time personnel at work on the survey date. Payroll and non-payroll employees are included. Non-payroll employees are persons who work in the jail but are paid by other organizations such as departments of health and education.

To calculate the 1970-93 jail employment index, the four employment indexes were linked. The average annual increase in jail employment between 1970 and 1993 is 7.3 percent with increases in 22 of the 23 measured years (table 54).

Table 54. Local government jail labor index, 1970-93

Year	1970-78 index	1978-83 index	1983-88 index	1988-93 index	Linked index
1970	100.0				100.0
1971	104.9				104.9
1972	115.0				115.0
1973	126.7				126.7
1974	135.2				135.2
1975	146.8				146.8
1976	151.2				151.2
1977	157.0				157.0
1978	156.8	100.0			156.8
1979		104.3			163.6
1980		109.7			171.9
1981		111.3			174.5
1982		116.4			182.4
1983		124.5	100.0		195.1
1984			109.0		212.8
1985			118.4		230.9
1986			125.5		245.0
1987			141.6		276.2
1988			154.3	100.0	301.1
1989				115.8	348.7
1990				132.1	397.8
1991				147.5	444.3
1992				158.0	475.8
1993				166.1	500.2
Average annual percent change:					
1970-92					7.3
1970-93					7.3
1970-78					5.8
1978-83					4.5
1983-88					9.1
1988-93					10.7

Productivity indexes

Local government jail productivity, as measured by output per employee, decreased 2.4 percent per year between 1970 and 1993. However, the period was marked by two distinct trends. Between 1970 and 1978, the average annual decrease was 5.3 percent; between 1978 and 1992, the decrease was 0.8 percent annually (table 55).

Table 55. Local government jail labor productivity indexes, 1970-93
(1970 = 100)

Year	Output	Input	Productivity
1970	100.0	100.0	100.0
1971		104.9	
1972		115.0	
1973		126.7	
1974		135.2	
1975		146.8	
1976		151.2	
1977		157.0	
1978	101.2	156.8	64.6
1979		163.6	
1980		171.9	
1981		174.5	
1982	130.3	182.4	71.5
1983	139.0	195.1	71.2
1984	145.8	212.8	68.5
1985	159.6	230.9	69.1
1986	170.7	245.0	69.7
1987	184.0	276.2	66.6
1988	213.6	301.1	70.9
1989	246.0	348.7	70.5
1990	252.0	397.8	63.4
1991	265.2	444.3	59.7
1992	276.5	475.8	58.1
1993	285.9	500.2	57.2
Average annual percent change:			
1970-92	4.7	7.3	-2.4
1970-93	4.7	7.3	-2.4
1970-78	.2	5.8	-5.3
1978-82	6.5	3.9	2.6
1978-92	7.4	8.3	-.8
1982-87	7.1	8.7	-1.4
1982-92	7.8	10.1	-2.0
1987-93	7.6	10.4	-.7

Adult Probation and Parole

Probation and parole is the third leg of the State and local government adult corrections stool, the other two legs being jails and prisons. Probation and parole is the primary community-based function, and it is the largest of the three functions in terms of the number of individuals handled.

Institutional setting

There were almost 3.4 million persons on probation or parole in 1992. Probation, the most frequently used sentence in the criminal justice field, accounted for 2.8 million. The other 0.6 million individuals were on parole. Over the 1976-92 period, the years for which comparable data are available, the number of persons on probation and parole tripled. The average annual increase is 7.4 percent (table 56).

Table 56. Number and index of probation and parole offenders under State and local government supervision, 1976-92
(1976 = 100)

Year	Probation	Parole	Total	Index
1976	923,064	156,194	1,079,258	100.0
1977	967,567	159,447	1,127,014	104.4
1978	1,020,770	160,556	1,181,326	109.5
1979	1,037,944	191,767	1,229,711	113.9
1980	1,072,728	196,786	1,269,514	117.6
1981	1,179,223	203,418	1,382,641	128.1
1982	1,308,130	203,331	1,511,461	140.0
1983	1,532,721	230,115	1,762,836	163.3
1984	1,688,597	250,138	1,938,735	179.6
1985	1,913,334	283,139	2,196,473	203.5
1986	2,057,484	308,763	2,366,247	219.2
1987	2,186,776	343,902	2,530,678	234.5
1988	2,325,398	387,145	2,712,543	251.3
1989	2,463,019	435,381	2,898,400	268.6
1990	2,612,012	509,714	3,121,726	289.2
1991	2,673,236	568,887	3,242,123	300.4
1992	2,750,285	614,381	3,364,666	311.8
Average annual percent change:				
1976-92	7.1	8.9	7.4	7.4

SOURCE: *Sourcebook of Criminal Justice Statistics*, selected issues, and *Probation and Parole*, selected issues

Under both probation and parole the offender is released into, and supervised in, the community. The principal difference between the two processes is how the procedure is initiated. The court usually sets probation at the time of sentencing, although it may follow a term of incarceration. Parole follows a prison or jail term and results from a parole board decision or from mandatory conditional release by the courts. Supervision within the community can range from continuous monitoring through electronic surveillance to little or no regular contact.[69]

Probation and parole law and practice varies by State. In some States, probation is an executive branch function, in others it is a judiciary responsibility, and in still others it is mixed. Juvenile probation and parole is usually a function of juvenile courts, an activity that is often known as aftercare.

Probation can be a State or local government function. A 1976 study found that 32 States operated probation systems, 12 States assigned that responsibility to local government, and 6 had some type of combination.[70] A 1988 study found a similar situation. The States assigning probation to local government often retained oversight responsibility for such functions as finance, setting of standards, and training.[71] The 1988 survey also found that 43 percent of the local offices provided probation services, 21 percent provided parole services, and 36 percent were responsible for both probation and parole services.[72]

Most offenders released from prison are placed on parole.[73] However, the percent released into parole varies by State. In 1965, some States released all prisoners into parole. But in recent years there has been a movement away from parole and toward determinate sentencing. In 1977, 72 percent of the inmates released from prison were released at the discretion of a parole board. In 1987 the figure was 41 percent. And at least one State, Maine, eliminated all discretionary parole.[74]

Pardons of adult offenders are often included in discussions of probation and parole. Data on this area are also commonly lumped together. But, in many cases, the data do not indicate whether pardons are included or excluded. In any event, pardons are ex-

tremely limited, particularly when compared to probation and parole. Hence, it is an issue that can safely be ignored in the calculations.

Definitions of each of these four functions—probation, parole, pardons, and aftercare—are presented in table 57.

Table 57. Definitions of probation, parole, pardon, and aftercare

Probation	is a sentence whereby the convicted person is released into the community rather than being incarcerated Subject to certain conditions and restrictions imposed by the court, the person is subject to supervision by the probation authority.
Parole	is the release of a prisoner by the decision of a paroling authority before the prisoner's full sentence has been served. As with probation, the person released is subject to certain conditions and restrictions imposed by the paroling authority.
Pardon	is a popular term for clemency. Technically it is one type of clemency. A pardon can be absolute or conditional.
Aftercare	is a commonly used term for juvenile parole. Juvenile parole and aftercare are used interchangeably.

Probation and parole operations are specified in the *Standard Industrial Classification Manual* as Individual and Family Social Services, SIC Code 8322. The *Manual* lists about 40 different types of operations, including parole and probation offices, under SIC 8322.[75]

Statistics are lacking as to what part of SIC 8322 resources go to support State and local government parole and probation operations, and what part go to support other activities covered by this SIC code.

The SIC 8322 code description does not specifically mention pardons, and so far as is known, this function is not mentioned any place in the *SIC Manual*. The Bureau of Census public employment definitions include pardons in the probation and parole category. The inclusion or exclusion of pardons should not have much of an affect on resource, output, or productivity calculations as noted above. The function is just too small.

Aftercare, or juvenile parole and/or probation, is sometimes included in general discussions of probation and parole. The *SIC Manual* does not explicitly mention juvenile parole, probation, or aftercare. Nor does the Census of Governments documentation assign it to a specific category. State treatment varies, and it is not obvious how specific States handle their reporting.

Probation and parole work is commonly divided into two parts, investigation and supervision. A 1967 study found that probation officers spent about 25 percent of their time on investigation and 75 percent on supervision (i.e., case management).[76] A Michigan report noted that 34 percent of the work units (time) were spent on investigations while 66 percent were spent on supervision.[77] However, a New York State study reported that the costs were roughly divided between investigation and supervision.[78]

Investigation involves examination of the background of the suspect, usually for a judge but sometimes for a parole authority. The results of the investigation are used to determine bail, set sentencing in case of conviction, set conditions for early release, set prison classification, plan treatment, and plan parole.

A New York study reported four types of investigation: Prepleas, presentence, support, and juvenile delinquents. The time required per investigation ranged from 1 to 6 hours[79] A Michigan report noted that of the investigative time, presentence investigation accounted for 64 percent, special 10 percent, preparole 3 percent, and other 23 percent.[80] A California study found that presentence investigation (PSI's) accounted for half of probation officers' time.[81]

For the country as a whole, the most common type of investigation is the presentence investigation. In at least 22 States it is mandatory for all felon cases, and in 19 States it

is required when probation is a potential sentence. In the remaining States it is discretionary. For misdemeanor offenders it is rarely completed. There has been a movement in recent years to greater standardization of the PSI, and to cut back its scope and length.[82]

Supervision oversees individuals on probation or parole to ensure that they adhere to the terms of their court imposed sentence. The types and levels of supervision range from constant electronic surveillance to intensive supervision where the probation officer sees the probationer or parolee several times each week to simple mail contact once a month to no regular contact. Supervision usually means checking and verification but also can include referrals to education, job training, housing, and counseling. "Only a small percentage of (the) probation population is being monitored, either by a person or by an electronic device."[83]

A New York State study presented statistics for three types of supervision of criminals: Intensive which required 3 to 4.5 hours per month of supervision; active which required 1 to 1.5 hours each month; and special which required a half hour to three-quarters of an hour of supervision each month. The study also found that the higher the caseload the less time spent on the activity, and the less time spent with each client.[84]

The work of probation officers has changed over the past several decades. Today, officers are less concerned with the provision of services such as counseling, and more concerned with control, specifically, drug testing, curfew violations, employment verification, surveillance, and revocation procedures.[85]

Although, there has been some research and experimentation on the effectiveness of parole and probation services over the past 30 years, there has been little discussion of efficiency and productivity. The lack of interest carries over to data collection. Where national statistics have been collected on the prison population for decades, it is only recently that national parole and probation data have been collected and published. Collection of statistics on the work of probation and parole units is ad hoc.[86]

Probation and parole is a disparate field with different institutional arrangements. Furthermore, there has been great change in the work processes over the past several decades, change that continues today. Because of this change it is difficult to collect and array a consistent set of statistical data that can be used to measure labor productivity.

Outputs

This section considers the measurement of probation and parole outputs. As with other government services, outputs are examined, not outcomes or impacts. The effectiveness of probation and parole operations, such as the recidivism rate, while important, falls outside the domain of productivity the way that the term is used here. Consequently, it is the work of State and local government probation and parole employees that is of interest.

The following have been suggested as possible measures of adult probation and parole output:

- Number of parolees and probationers
- Number of parolees and probationers separately counted and weighted
- Number of parole and probation services differentiated by basic type
- Number of parole and probation services differentiated by type and level of supervision
- Number of parole and probation work units

Each measure is briefly reviewed, the strengths and weaknesses discussed, and the results summarized. The criteria used to evaluate the candidate output measures were discussed in chapter 2.

Number of parolees and probationers. The first measure, and probably the most frequently cited measure of adult probation and parole output, is a count of the number of offenders under supervision at a given point in time. National data are collected annually by the Bureau of Justice Statistics from which this index can be calculated.

While this measure satisfies most of the output evaluation criteria presented in chapter 2, it has two serious defects. One, it does not measure the service provided; rather it measures the number of individuals who *might* receive the service. Two, it does not take into account the different labor units spent in producing the outputs. These two deficiencies would not be a problem if each offender received the same type and level of service, and this did not change through time. However, this is not the case. Although the statistics are skimpy, there are a number of individuals who are under supervision and counted, but who receive little or no service. And the type of service appears to have changed through time. These are fatal flaws for this measure.

Number of parolees and probationers separately counted and weighted. A variation of the first measure, this measure counts parole and probation separately, weights them, and then combines them to create the output index. This measure assumes that the service levels and unit labor requirements differ for probation and parole, a likely fact. It also assumes that probation and parole services can be adequately measured by simply differentiating and weighting the two functions.

Limited evidence suggests that parole cases require higher supervision levels than probation cases. One study found that 11 percent of the parole cases required intensive supervision and 35 percent required maximum supervision. The study also noted that parole officers had median caseloads of 65 cases each while probation officers carried 109 cases each. In the case of investigations, probation reported 129 studies per month compared to 75 for parole. Whether the ratio between probation and parole changed through time or if it changed at the same rate was not noted.[87]

This measure suffers from many of the same deficiencies of the preceding measure. That is, within the individual functions, parole and probation, the types and levels of service vary, and they change through time. Not everyone on probation and parole will receive the same level of service. This candidate measure may be an improvement over the first measure, but only marginally. It is unlikely to be satisfactory for measuring probation and parole productivity output.

Number of parole and probation services differentiated by basic type of service. This measure attempts to overcome the deficiencies noted in the first two measures by focusing on three basic types of service for parole and for probation. They are: Number of intakes conducted; number of investigations made; and number of offenders supervised. Each should be weighted using the appropriate unit cost or labor weights and the outputs combined to create the output index.

Conceptually, this measure is preferred to the first two measures that make no allowance for the different types of service provided. Whether it is sufficiently differentiated to accurately track outputs is not known, and because data are lacking to compute this measure, there is no way to evaluate this question.

Number of parole and probation services differentiated by type and level of supervision. This measure is the same as the previous one except that the level of supervision is differentiated. The level of supervision can have a real impact on output per staff member. One study noted that while there was no scientific basis for making a selection, three levels of supervision seem to be the norm in most departments of corrections.[88]

A study in Missouri in the early 1980s presented statistics on three types of supervision—intensive, regular and minimal—and four types of investigation—presentence investigation (PSI), partial PSI, 30-Day, and other.[89] The amount of work varied by type of case and type of investigation. Also, both seemed to vary through time. The amount of time devoted to each of these tasks varied greatly. Another article noted that regular probation had as many as 300 cases per probation officer while intensive supervision had 33.[90]

Data collected by the Bureau of Justice Statistics show that between 1985 and 1992 the number of active probation cases increased by 42 percent, inactive 99 percent, those

who absconded 78 percent, and those supervised out of State 39 percent. For parole, the percentage increase was even larger: 119 percent for active, 217 percent for inactive, 179 percent for absconders, and 58 percent for out of State.[91]

Further differentiation of output, as recommended by this measure, would be helpful. The problem with calculating this measure, as with measures 3 and 5, is data availability.

Number of parole and probation work units. An even more carefully defined measure of probation and parole outputs is the number of work units produced. This is essentially an activity-based measure. The study of New York probation work units noted earlier identified multiple types of work units such as supervision of adult misdemeanants and felons, children in need, juvenile delinquents, juvenile offenders, and persons who do not support their families. But it did not distinguish between the different types of supervision, nor did it address parole operations.[92] To compute an index using work units requires data for several dozen different outputs. While desirable analytically, this approach is clearly infeasible for a national probation and parole output index.

Review. All of the measures discussed in this section are deficient in one way or the other. For several, it would be impossible to collect some kinds of data; for others, where local data are available, national data are not; and for others, where data exist the measure is unsatisfactory conceptually because they do not capture the work of probation and parole organizations.

Labor inputs

Labor is a good measure of the resources used in probation and parole operations because it accounts for such a large percent of the function's operating expenditures. While national statistics are lacking, labor apparently accounts for an even greater share of the probation and parole operating costs than it does for prisons and jails. According to a study of the New York City Division of Parole, personnel costs amounted to 84 percent of total parole costs in the mid-1970s.[93] Another study, this one of two Arizona counties, found that salary costs alone accounted for over 80 percent of total probation operating costs.[94] Given the labor-intensive nature of probation and parole work, these statistics are quite understandable.

In 1990, there were 72,040 State and local government full-time equivalent employees in the probation, parole, and pardon field according to the Bureau of Justice Statistics. In 1971 there were 34,200. Thus, there has been a doubling of the number of FTE employees over the 19 years for which data are available. But, as a percent of total correctional employment, probation and parole has dropped from 23 percent in 1971 to 14 percent in 1990 (table 58).

From the limited data available, it appears that correctional employment and probation and parole employment increased at about the same rate during the early 1970s. However, starting in the latter part of the 1970's, probation and parole employment lagged behind the rate of increase in overall correctional employment. This reflects the dramatic increase in prison and jail employment.

As noted earlier, both State and local governments operate probation and parole services. In 1990, there were about 15 percent more State employees than local employees (38,329 versus 33,365). Local government probation and parole employment is predominantly county government employment; municipalities account for a small part.[95] In 1988, most, 96 percent, State and local government probation and parole employees worked full time. [96]

Table 58. Comparison of probation and parole and total corrections full-time equivalent employment, selected years
(1971=100)

Year	Probation and parole		Total corrections	
	Number	Index	Number	Index
1971	34,200	100.0	151,000	100.0
1972	37,200	108.8	160,000	106.0
1973	39,500	115.5	172,000	113.9
1974	46,000	134.5	185,000	122.5
1975			193,000	127.8
1976			206,000	136.4
1977			218,000	144.4
1978			222,000	147.0
1979	51,301	150.0	236,000	156.3
1980			249,000	164.9
1981			259,000	171.5
1982			277,000	183.4
1983			297,000	196.7
1984			325,000	215.2
1985	57,158	167.1	350,000[1]	231.8
1986			369,000	244.4
1987			402,780	266.7
1988	63,893	186.8	435,237	288.2
1989			469,215	310.7
1990	72,040	210.6	503,181	333.2
1991			521,880	345.6
1992			533,569	353.4

[1]Estimated because FTEs were not calculated by the Bureau of the Census for 1985.

SOURCE: Probation and parole: *Justice Expenditure and Employment in the U.S.*, selected issues, and *Sourcebook of Criminal Justice Statistics*, selected issues. Total Corrections: U.S. Bureau of Census, *Public Employment*, selected issues, Washington: Government Printing Office.

For government productivity measurement, the usual labor measures, as discussed in chapter 2, are the total number of employees and the number of full-time-equivalent employees. In the case of probation and parole it, both should be calculated, if possible, because the FTE numbers appear to be increasing at a more rapid rate.

There are many problems with the probation and parole employment data. First, the information is spotty. For about half the years even the basic data are lacking. This would not be a concern if good benchmark data were available, but they are not. For most years data on the number of non-paid personnel are lacking (i.e., personnel who work for other government agencies such as the courts). This apparently is a particular problem for juvenile aftercare operations. For other years, data are available on State employment but there are no data (or only partial data) on local employment. Another problem is being able to relate employment with work. As noted in the discussion of outputs, basic information about the work of employees is lacking. Do they work on probation, parole, pardons, presentence investigations, or supervision of those released? In short, the available employment data raise as many questions as they answer.

Conclusions

As noted earlier, it is not possible to compute a national probation and parole labor productivity index because of the lack of data. There are problems with both inputs and outputs, but the primary problem is the measurement of output. The only readily available national data are counts of the number of persons assigned to probation or parole, data that say nothing about the work of probation and parole employees.

Juvenile Correctional Institutions

Institutional setting

Juvenile institutional operations are often set apart from other correctional operations, and sometimes are not even included in discussions of correctional institutions. Their categorization varies by State. They are included in this bulletin because their labor productivity measurement issues are similar to those of the adult correctional institutions.

There are over a thousand State and local government operated juvenile correctional facilities, a number that has remained relatively steady since 1979. In 1991, the States operated 47 percent of the 1,076 facilities and local authorities operated the rest. [97]

Although State and local governments both operate juvenile facilities, the focus of their operations is quite different. Local governments tend to focus on intake, screening, initial processing functions, and short-term detention. They handle about three-quarters of all juvenile admissions to State and local government facilities. State governments, on the other hand, tend to focus on long-term care, and in 1991, they held 62 percent of all juveniles in State and local government facilities.[98]

Every State operated at least one juvenile facility in 1991. New York operated 66, the most of any State. The greatest number of local government operations was in California where there were 92. Thirteen States had no local government juvenile institutions.[99]

In 1991, State and local government institutions held almost 58,000 juveniles. In 1971, the first year for which comparable data are available, the figure was almost 55,000. Although the number of juveniles increased about 5 percent between 1971-91, the number of facilities increased by almost 50 percent. As a result of the growth in the number of facilities the number of residents per facility dropped. In 1971 there were 76 residents per facility; in 1991 there were 54.[100]

Cost data are lacking which would permit estimates of State and local government juvenile correctional institutions as a percent of the total correctional population. State data suggest that about 10 percent of State correctional operating budgets go to support juvenile operations. In 1990 this was about $1.4 billion. A survey of county governments in 1988 found that about 15 percent of their corrections budget, or $315 million was devoted to juveniles; this number cannot be extrapolated to all local governments because of the differences in how juveniles are handled by local government.[101] In some States local governments have no responsibility but in others they have total responsibility.

In addition to government operated juvenile facilities, a number of private, nonprofit and for profit, juvenile operations exist. Indeed, there are almost twice as many private facilities as public facilities (2,032 versus 1,076 in 1991). The number of private facilities has been increasing more rapidly than the number of public institutions. Most States have more private facilities than public. In the early 1980s, Vermont used only private facilities to house its juveniles. [102]

The majority of juveniles, however, are still held in government operated facilities, and the type of facilities operated by the two sectors is quite different. Government-operated facilities, which mostly operate in a closed environment, oversee the more violent juveniles.[103] Government held 80 percent of its juveniles in secure facilities in 1985 while private operators held only 16 percent. Private facilities, on average, held fewer juveniles per facility (17 versus 47 for government) and kept juveniles longer (126 days versus 41 days for government). The cost per juvenile per year was quite similar in 1984 ($25,200 government versus $24,329 private).[104]

Juveniles are often classified and separated into delinquents, status offenders, and non-offenders. Delinquents are juveniles who have been charged with or have been convicted of a crime. This is the group that, for the most part, populates government facilities. Status offenders are juveniles who are accused of committing or having committed an offense, which would not be an offense if committed by an adult. Examples are school truancy, running away from home, ungovernability, and consumption of alcohol. Nonoffenders are juveniles who are not charged with any offense, but for lack of

other alternatives end up in the juvenile correctional system. These include neglected or abused children.[105]

There has been a concerted attempt through time, but especially over the past 20 years, to remove all non-delinquents from juvenile institutions. The 1974 Juvenile Justice and Delinquency Prevention Act sought to remove those juveniles who were neglected, dependent, abused, emotionally disturbed, mentally retarded, voluntarily admitted, and awaiting court disposition.[106] Status offenders, those who were held for committing non-criminal acts, such as truancy and running away from home were also removed. From 1975 to 1985 the number of status offenders in public juvenile institutions was reduced by 49 percent. One result of the passage of the 1974 Act was to increase the juvenile delinquent population, as a percent of the total, from 73 percent in 1975 to 93 percent in 1985. Another result was to reduce, at least temporarily, the number of admissions to public juvenile institutions.[107]

Removal of juveniles who were confined for non-criminal acts has also shifted the male-female ratio in public juvenile institutions. In 1975, females comprised 19 percent of the juvenile population, in 1985 they made up 14 percent, and in 1991 they were 11 percent.[108]

The age a person is classified as a juvenile varies by State. As of 1994, three States set the upper age limit for juveniles at 15, eight States set it at 16, and the remaining set it at 17. Except for Wyoming, the age was not changed between 1978 and 1994.[109] Every State permitted juveniles to be charged as adults in certain cases.[110] The average age of juveniles held in State and local government facilities in 1983 was 15.4 years. This is not an issue here because individual State definitions and statistics are used for measurement purposes.

The productivity measurements discussed in this section relate to State and local government juvenile institutions as specified by the *Standard Industrial Classification Manual*, code 8361:

> Establishments primarily engaged in the provision of residential social and personal care for children, the aged, and special categories of persons with some limits on ability for self-care, but where medical care is not a major element. Included are establishments providing 24-hour year-round care for children. Boarding schools providing elementary and secondary education are classified in Industry 8211. Establishments primarily engaged in providing nursing and health-related personal care are classified in Industry Group 805.[111]

The *Manual* lists about 30 different types of facilities covered by this code ranging from "Boy's towns" to "Homes for destitute men and women." The juvenile facilities specifically mentioned are "Juvenile correctional homes, halfway homes for delinquents and offenders, and training schools for delinquents."

Statistics are lacking as to what part of SIC code 8361 resources go to support juvenile facilities, and what part go to support the other activities covered by this group. However, it is assumed that juvenile operations are a small part of the operations covered by this SIC code. Private residential care is a large industry in the United States, employing well over 500,000 individuals in 1991. Government juvenile facilities employed about 62,000 individuals in the same year.[112]

Employment in juvenile institutions is a small part of total employment in the overall State and local government correctional field. In 1991, juvenile institutional employment accounted for about 10 percent of such employment. Although there has been an increase in juvenile institutional employment over the past two decades, it has not kept pace with the massive growth in employment in prisons and jails.[113]

Compared to many other State and local government functions, government employment and expenditures for juvenile operations is of minor importance. However, there has been considerable interest in the field of juvenile corrections for many years. Statistics were collected and published on reformatories in the United States in middle

of the nineteenth century, and the 1870 report of the U.S. Commissioner of Education included statistics on juvenile facilities. Data have been collected and published periodically by the Federal Government every since.[114]

Outputs

This section discusses the measures used to assess the output of juvenile institutions in the United States, selects the measure to be used in the computations, and computes and presents an index.

Output measures

There is considerable discussion of the juvenile correctional field, including proper treatment modalities, recidivism rates, and outcomes. Nevertheless, there is little discussion of how to measure the output of juvenile institutions for productivity measurement purposes.

This section examines the work of State and local government juvenile detention operations, such as the number of residents, number processed, the number released, counseling provided, courses taught, and the like. The following measures have been suggested in personal discussions as possible measures of juvenile institution output:

- Juvenile residents
- Juvenile residents by type of facility
- Residents (juvenile and adult)
- Average daily population (ADP)
- Facilities
- Admissions and discharges
- Program services

Each suggested output is briefly reviewed, and its strengths and weaknesses discussed. The criteria used to evaluate the candidate output measures were listed in chapter 2.

Juvenile residents. Probably the most frequently cited and used measure of juvenile institutional output is a count of the number of juveniles housed. The statistic is often broken down by sex, age, and inmate status. This measure meets most of the output evaluation criteria cited in chapter 2. It is simple, straightforward, and uses physical counts; data are readily available to compute this output for a number of years. There is no apparent research that discusses the relationship between this output and the resource units spent in its production.

Juvenile residents by type of facility. A variation of the count of juveniles is a count by type of facility in which they are held. The six basic types—detention centers; shelters; reception/diagnostic centers; training schools; ranches, forestry camps, or farms; and half-way houses or group homes—are briefly described in table 59. The reason for differentiating outputs by type of facility is that their unit resource requirements differ, and there have been shifts through time in the growth of outputs by type of facility.

Table 59. Types of basic juvenile facilities

Detention center	A short-term facility that provides custody in a physically restricting environment pending or following adjudication, pending disposition, placement, or transfer.
Shelter	A short-term facility that provides temporary care similar to that of a detention center but in a physically unrestricted environment.
Reception or diagnostic center	A short-term facility that screens persons committed by courts and assigns them to appropriate custodial facilities.
Training school	A long-term facility for adjudicated juvenile offenders typically under strict physical and staff control.
Ranch, forestry camp, or farm	A long-term residential facility for persons whose behavior does not require the strict confinement of a training school, often allowing them greater contact with the community.
Halfway house or group home	A long-term, nonconfining facility in which residents are allowed extensive access to community resources, such as schooling, employment, health care, and cultural events.

SOURCE: *Children in Custody, 1975-85*, NCJ-114065, Washington, DC: U.S. Bureau of Justice Statistics, May 1989, p. 4

By differentiating the residents by type of facility some of the differences in program services are captured. For example, facilities that care for juveniles on a long-term basis, in a relatively open environment, have the lowest average unit labor requirements. There are two reasons for this: less need to process residents in and out of the facilities and less need for security personnel to maintain discipline. Examples of such facilities are ranches, camps, and farms and halfway houses and group homes. In the latter case, direct costs are further reduced by the use of community schools, recreation centers, and health clinics, that is, facilities that are operated by non-juvenile institutional staff.

This output measure should be superior to the first measure for productivity purposes because it differentiates and weights outputs by their unit labor requirements. Like the first measure, it is simple, straightforward, and uses readily available data.

Residents (juvenile and adult). The first two measures reflect the number of juvenile residents. A better measure of output for productivity measurement is a total resident count, not just a juvenile count. Most residents of juvenile institutions are juveniles, but a small percentage are adults. The percent has fluctuated from a high of 5.0 percent in 1974 to a low of 1.7 percent in 1993.[115]

There are two reasons for housing adults in juvenile facilities. First, there are individuals who are confined as juveniles but age to majority while confined, and second, there are juveniles who were tried and convicted as adults but are held in juvenile facilities for their own protection. For productivity measurement purposes all residents should be counted since the resources support all residents, not just juveniles. So long as the ratio between juveniles and all residents is reasonably constant through time it should not matter which one is used for calculation of trends.

This measure, like the first two, is simple, straightforward, uses physical counts, and summary data are readily available since 1971. What is lacking is information on the type of resident by type of facility.

Average Daily Population. Another commonly used measure of juvenile institutional output is the average daily population (ADP) count. This is usually a better measure than the 1-day count when assessing output over an extended period, such as a month or year, because it captures the change through time in the number of residents. Also the ADP is not affected by extraordinary events that may affect one-time counts. The day or time of day that the count is taken may affect the one-time count. A Sunday count is likely to be somewhat different from a Monday count.

A comparison of the ADP and 1-day count shows that in some years the ADP is greater and in others the 1-day count is greater. Conceptually, the average daily count is preferred, but because ADP is not readily available by type of facility, the 1-day census count is often used. Like the preceding measures, the ADP is a physical count, often used, and readily understood. There are questions concerning the calculation of the average daily population measure, which were discussed in the State prison section.

Facilities. The number of facilities is sometimes mentioned as a measure of output. While it is a readily available statistic, it is not a good measure of output for productivity measurement. Facility size varies and has changed through time, and productivity is affected by many factors other than the number of facilities. While a facility count is measurable, repetitive, accurate, readily collected, and readily understood it is not the final service of the organization. It is not considered further as a measure of output.

Admissions and discharges. There is considerable turnover of the juvenile population. The number of admissions has varied from 616,766 in 1971 to 527,759 in 1984 to 683,636 in 1990. The ratio between the number of admissions and the number of residents has varied between 10 and 14 between 1971 and 1990. Admitting and discharging juveniles requires some government resources, but how much is not known. The data needed to compute the unit resource weights for admissions and discharges are lacking and, as a result, an output index cannot be calculated.

Program services. Program services such as academic education, vocational training, recreation services, counseling, religious services, and the like are provided in most, if not all, juvenile institutions. The type, number, and intensity of such services vary by facility. Such activities should be considered in preparing any productivity index because they can consume considerable resources.

The problem in such a computation is how to measure these services and how to include them. These are the same issues discussed in the section on prisons and jails. It is difficult to measure government program services in the best of circumstances. In the case of juvenile institutional education, one might measure the number of classes, the number of participants, and the number of graduates. But as with most educational services, the question is what is the correct measure?

In the case of juvenile institutions the conceptual questions are moot because there are no national output data on any of the program services. The only readily available data are staff counts, which are inputs, not outputs.

Program service resources are partially captured when output is differentiated by type of facility and weighted. For example, halfway houses or group homes use fewer resources than training schools, and part of the difference is due to the program services provided by the training schools.

Quality and crowding

This section briefly considers a number of other factors, such as quality and crowding, that might affect productivity output calculations. Although it is easy to discuss such considerations and their potential effect on productivity in the abstract, there is little agreement on what constitutes quality and how it should be measured. Generally, when individuals discuss juvenile detention quality they focus on space per resident, cleanliness, program availability, food quality, and so forth. No research was found on how these factors affect productivity.

Institutional crowding is a special concern for juvenile institutions as it is for the

Nation's jails and prisons. However, the problem appears to be less acute for juvenile facilities. The design capacity for juvenile institutions in 1985 was 56,895 while the average daily population was 47,496 and the Census-day count was 51,402.[116] That is, there was almost 20 percent excess capacity for the ADP and 11 percent for the Census-day count. However, these statistics are overall averages and do not take into account peak periods and local area distribution. In 1985, about 17 percent of juvenile facilities were operating in excess of their design capacity; in 1971 the figure was 16 percent. In 1985, 36 percent of the juveniles were held in crowded facilities. In other words, a few large facilities were responsible for most of the crowding.

What effect does juvenile facility crowding have on juvenile institutional productivity? No information was found that addressed this subject. The only information on correctional institutional crowding comes from studies of prisons and jails. Some individuals have argued that crowding leads to increases in labor productivity.[117] However, most of the evidence suggests the opposite, that crowding has a negative affect on productivity.[118] As with other correctional operations, the courts have intervened to ensure minimal standards of juvenile operation. The data in this bulletin are not calculated to adjust for juvenile crowding

Recidivism and other outcome measures

The outcomes or results of juvenile institutional operations, such as the recidivism rate, juveniles returned to their families, the number of residents moving on to a life of crime, and the like, fall outside the domain of productivity measurement the way the term is used here. This section deals with the work of State and local government juvenile detention operations, such as the number of residents, number processed, counseling provided, courses taught, and the like. Hence, as with the other services discussed here, no attempt will be made to measure productivity outcomes.

The output series

This section presents an output index for juvenile detention institutions. Based on a review of the available research and data, the following measure is proposed:

> The number of residents differentiated by facility type: Detention centers; shelters; reception/diagnostic centers; training schools; ranches, forestry camps and farms; and half-way houses and group homes.

Several other factors should also be included, such as the number of program services and the number of admissions and discharges, but data are lacking with which to make such calculations.

National data to construct the index are taken from the U.S. Department of Justice's Office of Juvenile Justice and Delinquency Prevention (OJJDP) statistical collection efforts. Data for 1971, 1973, 1974, 1975, 1977, 1979, 1983, 1985, 1987, 1989, 1991, and 1993 are taken directly from OJJDP's *Children in Custody* series. Data for the missing years are estimated.

Outputs have been calculated for six different facility types (table 60). Each reflects the number of juveniles from 1971-87 and the number of residents from 1987-93. The preferred measure is the number of residents. But these data are not readily available prior to 1987, thus, the two different counts are used and linked in 1987.

Table 60 shows rapid increases for halfway houses and group homes and moderate increases for detention centers and shelters. The average annual increase in growth of halfway houses and group homes was 5.1 percent with increases in about half the years. The long-term growth in detention centers was 2.6 percent, but there are two distinct periods of change. From 1971-77, the number of juveniles declined but from 1977-93 the number increased. The average annual increase from 1977-93 was 4.6 percent. While the number of shelter residents increased substantially between 1971 and 1993 the growth has been erratic. The reasons behind the abrupt changes between 1975-79 and 1984-87 are not known. Output declined for reception centers, training schools, and ranches, camps, and farms over the 1971-93 period. Training schools, the largest facility type in terms of the number of residents, registered a slight decline. The index declined from

1971 through 1979. Since then, the index has increased at a 1.3-percent average annual rate. Reception centers also showed a steady decrease through 1979, and have increased since then. This is not surprising because they are the first step for most juveniles moving on to a training center. Ranches, camps, and farms have registered a fairly steady average annual decrease, 0.7 percent, throughout the period.

Table 60. Juvenile institutional output indexes by type of institution, 1971-93
(1971 = 100)

Year	Detention center	Shelter	Reception center	Training school	Ranch farm	Halfway house
1971	100.0	100.0	100.0	100.0	100.0	100.0
1972	95.8	76.4	90.3	88.9	95.3	132.3
1973	91.6	52.8	80.5	77.7	90.6	164.6
1974	93.6	50.0	63.9	74.7	95.6	177.5
1975	94.2	55.6	66.7	78.7	98.4	218.1
1976	89.5	135.3	67.7	74.0	98.5	256.9
1977	84.8	215.0	68.7	69.4	98.6	295.8
1978	87.8	181.7	59.6	68.8	93.7	295.6
1979	90.8	148.3	50.5	68.2	88.8	295.4
1980	95.8	148.1	55.0	69.6	90.7	306.4
1981	100.8	147.8	59.5	71.0	92.6	317.4
1982	105.9	147.5	64.1	72.4	94.5	328.4
1983	110.9	147.2	68.6	73.7	96.4	339.5
1984	114.0	185.4	67.4	73.7	95.1	329.9
1985	117.0	223.6	66.2	73.7	93.7	320.3
1986	127.1	216.0	66.5	76.6	88.1	346.2
1987	137.2	208.3	66.7	79.5	82.5	372.0
1988	145.2	193.9	64.6	80.3	82.6	370.6
1989	153.1	179.4	62.4	81.1	82.7	369.2
1990	157.2	185.3	70.1	82.0	78.3	364.7
1991	161.3	191.1	77.9	83.0	73.9	360.3
1992	168.3	182.6	80.4	82.5	80.1	329.0
1993	175.3	174.2	82.9	82.0	86.3	297.7
Average annual rate of change:						
1971-93	2.6	2.6	-0.8	-0.9	-0.7	5.1

A weighted output index was also calculated for all juvenile facilities. That is, the six different types of facility outputs were weighted with their unit labor weights in 1971, 1977, 1983, and 1987, and combined to produce a single index. The base years reflect those years closest to the base years that BLS used in its government productivity estimates (i.e., 1972, 1977, 1982, and 1987). Unit labor requirements for 1971, 1977, and 1987 were computed directly from the data collected and published by the Department of Justice. Unit labor weights for 1983 were estimated using 1979 and 1987 data.

The results of the weighted (differentiated) output calculation shows that output was relatively flat over the entire 1971-93 period, dropping during the early years and rising thereafter. From 1971 through 1979, the average annual decrease was 3.1 percent. From 1979 through 1993, the average annual increase was 2.3 percent; there has been an increase every year since 1979. The overall average annual increase between 1971-93 is 0.3 percent (table 61).

An unweighted index was also calculated. That is, the number of residents was combined and the yearly totals indexed. The results of this calculation show an average annual increase between 1971-93 of 0.3 percent, the same as the weighted index. The similarity in the indexes reflects the dominant role of the training schools and detention centers, which account for over 80 percent of the residents.

Table 61. Comparison of undifferentiated and differentiated juvenile institutional output indexes, 1971-93
(1971=100)

Year	Undifferentiated index	Differentiated index
1971	100.0	100.0
1972	91.7	91.5
1973	83.5	83.0
1974	82.1	81.2
1975	85.8	84.6
1976	83.2	81.8
1977	80.6	79.0
1978	79.8	78.5
1979	79.0	78.0
1980	81.5	80.6
1981	84.0	83.3
1982	86.5	85.9
1983	89.0	88.6
1984	89.6	89.4
1985	90.1	90.3
1986	93.9	94.4
1987	97.8	98.6
1988	99.7	100.6
1989	101.6	102.6
1990	102.9	104.2
1991	104.2	105.7
1992	105.5	106.8
1993	106.8	107.9
Average annual rate of change:		
1971-92	0.2	0.3
1971-93	.3	.3
1971-79	-2.9	-3.1
1979-93	2.2	2.3

Labor inputs

There were about 62,000 State and local government juvenile facility employees in 1991; 58 percent were State employees and 42 percent were local. Of the total, roughly 53,000 were full time and 9,000 were part time. In addition, there were about 3,600 volunteers.[119]

The division between full-time and part-time employees varies by type of facility. Employees in State run training facilities, for example, are mostly full time (94 percent). On the other hand, less than 67 percent of the local government half-way house employees were full time.[120]

As with the other correctional fields, labor is the primary resource input into juvenile institutional operations. In 1975, wages and salaries accounted for about 75 percent of all operating expenditures.[121] Adding employee benefits to these statistics would raise the figure to well above 80 percent.

The total number of employees and the number of full-time equivalent employees are the statistics normally used to calculate government productivity employment indexes (chapter 2). Because of data concerns, neither index is computed for juvenile institutions. Instead, the total number of full-time employees is used. Data since 1987 suggest a fairly constant ratio between total and full-time employment. Prior to 1987, this ratio is unstable and there are serious concerns about some of the part-time employment data.

The juvenile institution labor index is constructed in two parts and linked. For 1971-

87, the index reflects the number of full-time payroll employees, full-time non-payroll, and full-time volunteers.[122] For 1987-93, the statistics reflect full-time payroll and non-payroll staff only; volunteers are excluded. The two data series are linked in 1987 to create the 1971-93 index.

Juvenile institutional employment data were collected for 1971, 1973, 1974, 1975, 1977, 1979, 1983, 1987, 1989, 1991, and 1993. Data for the intervening years were estimated. The survey dates are the same as for the outputs.

The results of these calculations show that the average annual increase in juvenile institutional labor was 1.3 percent between 1971-93 with an increase every year between 1973 and 1991. The increases have been steady and modest throughout the period (table 62).

Table 62. Index of full-time employees in State and local government juvenile institutions, 1971-93
(1971 and 1987 = 100)

Year	1971-87 index	1987-93 index	Labor index
1971	100.0		100.0
1972	99.6		99.6
1973	99.2		99.2
1974	99.7		99.7
1975	104.1		104.1
1976	106.9		106.9
1977	109.6		109.6
1978	110.9		110.9
1979	112.2		112.2
1980	112.9		112.9
1981	113.5		113.5
1982	114.2		114.2
1983	114.8		114.8
1984	117.1		117.1
1985	119.3		119.3
1986	121.6		121.6
1987	123.8	100.0	123.8
1988		101.4	125.6
1989		102.8	127.3
1990		105.7	130.9
1991		108.6	134.5
1992		108.3	134.1
1993		108.0	133.7
Average annual percent change:			
1971-92			1.4
1971-93			1.3

Productivity indexes

Although labor inputs increased at a fairly steady pace for most of the measured period, long-term outputs were fairly stable. The result was a drop in labor productivity of 1.0 percent per year between 1971 and 1993. However, there were two very distinct segments during this period. During the initial years (1971-79) labor productivity dropped 4.5 percent annually. Indeed, every year from 1971-79 shows a decline in productivity. But from 1979-93, productivity increased at an average annual rate of 1.1 percent (table 63).

In terms of absolute values, there were about 1.2 residents for each full-time (not FTE) staff member in 1993. But this ratio varies by type of facility, ranging from 1.5 residents to each full-time staff for ranches, camps, and farms to .8 for shelters. The ratio for training schools, which account for about 50 percent of those held in juvenile facilities, is the same as the overall average.[123]

Table 63. State and local government juvenile institution productivity indexes, 1971-93
(1971 = 100)

Year	Output index	Labor index	Productivity index
1971	100.0	100.0	100.0
1972	91.5	99.6	91.8
1973	83.0	99.2	83.6
1974	81.2	99.7	81.4
1975	84.6	104.1	81.3
1976	81.8	106.9	76.6
1977	79.0	109.6	72.1
1978	78.5	110.9	70.8
1979	78.0	112.2	69.5
1980	80.6	112.9	71.4
1981	83.3	113.5	73.3
1982	85.9	114.2	75.2
1983	88.6	114.8	77.1
1984	89.4	117.1	76.4
1985	90.3	119.3	75.7
1986	94.4	121.6	77.7
1987	98.6	123.8	79.6
1988	100.6	125.6	80.1
1989	102.6	127.3	80.6
1990	104.2	130.9	79.6
1991	105.7	134.5	78.6
1992	106.8	134.1	79.6
1993	107.9	133.7	80.7
Average annual percent change:			
1971-92	0.3	1.4	-1.1
1971-93	.3	1.3	-1.0
1971-79	-3.1	1.5	-4.5
1979-92	2.5	1.4	1.1
1979-93	2.3	1.3	1.1
1971-77	-3.8	1.5	-5.3
1977-83	1.9	.8	1.1
1983-87	2.7	1.9	.8
1987-92	1.6	1.6	0
1987-93	1.5	1.3	.2

SOURCE: Tables 61 and 62

Summary and Conclusions

This chapter discussed the measurement of productivity indexes of State and local government correctional services. Four were examined and average labor productivity indexes were calculated for three—prisons, jails, and juvenile correctional facilities. Probation and parole, the fourth area, is a very different operation, and could not be measured because of lack of adequate output data.

Corrections is a general government service. All States, and many local governments, are involved in the incarceration of men, women, and young people. Although a few governments contract with private firms to operate parts of their correction services—so called privatization—the function remains primarily a government one. An exception is juvenile institutions where there is a large, active non-profit industry. In this chapter, only government-operated facilities were measured.

State and local government spent almost $29 billion in fiscal 1992 on correctional services (table 44). Capital expenditures accounted for about 15 percent, operations about 85 percent. Because more than three-quarters of all operational expenditures are

devoted to labor compensation, its cost is a good indicator of the amount of resources devoted to correctional operations.

There were over 540,000 State and local government correctional employees in 1992.[124] The average annual increase in employment between 1967 and 1992 is over 6 percent.

Correctional employment is full-time employment. In 1992, 96 percent of all correctional employees worked full time.[125] The nature of the work, the specialized training required to carry out the work, and the security background investigations required of all employees, dictate the use of full-time employees.

The States employ 64 percent of all correctional employees. Local government, primarily counties, employs the rest. This division reflects State operation of prisons, and local government operation of most jails. State and local governments divide probation and parole and juvenile delinquency operations with the assignment depending on State law.

Prisons employ the largest number of correctional workers, about half of the total, jails follow with one quarter, and probation and parole and juvenile facilities employee the rest.

State and local correctional operations are one of the fastest growing government services. In response to community concerns, new laws have been passed, determinant sentencing has been implemented, and, in some cases, parole has been abolished. One result of these actions has been an increase in output for each of the three services and large increases for prisons and jails.

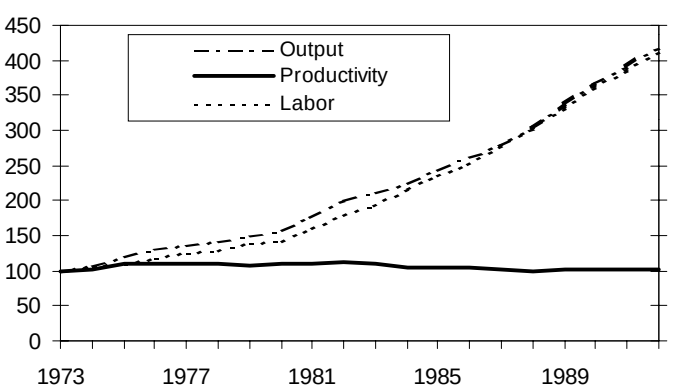
The increase in output has generated additional demand for labor. But there have been other pressures, too, probably the most important being court rulings. The courts have taken an active role in the operation of many State and local government correctional institutions, including specification of staffing requirements. This has contributed to the larger proportional increase in labor compared to output. This, in turn, has led to decreases in labor productivity as discussed below.

State adult institutions

Prison output and employment both increased rapidly during the measured period. Output grew 7.8 percent per year between 1973 and 1992, and the number of inmates increased every year (table 52). By 1992, there were over 750,000 inmates in State operated facilities. Every State shows large increases in the number of inmates since 1973, and nine States show average annual increases of 10 percent or more.

State adult institutional productivity showed little change between 1973 and 1992, but there were two slightly different trends. From 1973 through 1982, productivity increased 1.3 percent annually but between 1982-92 it dropped 1.0 percent per year (chart 7).

Chart 7. State government adult correctional institutions output, labor, and productivity indexes, 1973-92



Local jails

Local jails also registered increasing output and labor and decreasing labor productivity over the measured period, 1970-92. The average annual increase in output was 4.7 percent from 1970 through 1992, but there were two very distinct trends. From 1970 through 1978, output was fairly flat increasing 0.2 percent annually. From 1978 through 1992, the average annual increase was 7.4 percent, and every year from 1982 registered an increase (table 55).

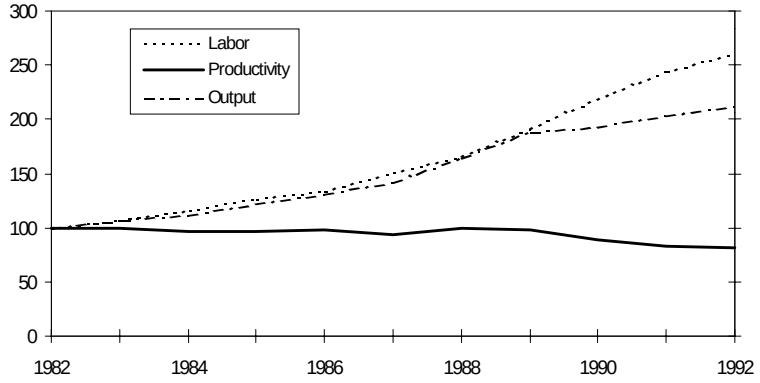
Comparison of jail and prison statistics show that during the 1980s, jail and prison output increased very rapidly. This is in marked contrast to the 1970s when jail output was practically flat and prisons increased rapidly. One reason for the increase in jail output in the 1980s is the increase in the number of State inmates being held in local jails because of overcrowding in State facilities. In 1988, 8 percent of the local jail population was being held for State authorities, mostly because of overcrowding in State prisons.[126]

Labor input grew at about the same rate as output. In response to the increase in the number of prisoners, prison crowding, more militant prisoners and court actions that dictated additional staffing, employment increased every year between 1973 and 1992. There were over 275,000 employees in 1992, an average annual increase of 7.8 percent between 1973 and 1992.

Like prisons, jail labor increased rapidly and many of the same events that drove the increase in prisons propelled the increase in jails: Crowding, more militant prisoners, and court decrees. There were an estimated 157,500 local government jail employees in 1992, an average annual increase of 7.3 percent between 1970-92.

One result of this increase was a drop in jail labor productivity. For 1970-92 productivity declined 2.4 percent annually; the average annual decline between 1982 and 1992 was 2.0 percent (chart 8).

Chart 8. Local government jail output, labor, and productivity indexes, 1982-92

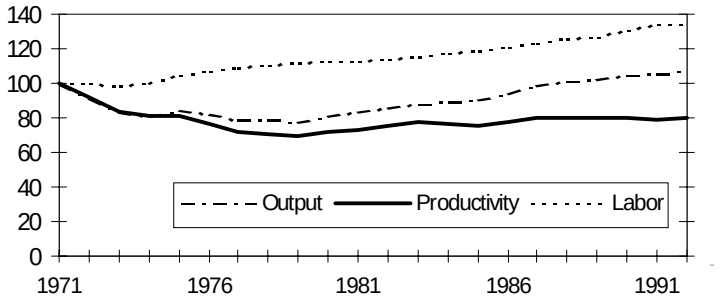


Juvenile institutions

Over the long term, juvenile institutional labor productivity declined as it did for prisons and jails. But, there were two very different trends in the case of juvenile institutions. Between 1971 and 1979, productivity dropped at an average annual rate of 4.5 percent, but between 1979 and 1992, it turned around and increased 1.1 percent per year (table 63). These trends are driven by the change in output. Output decreased from 1971 through 1979, but increased from 1979 onward. The average annual change for the two periods was -3.1 and 2.5 percent, respectively. Labor input increased at a fairly constant rate after 1974. By 1992 there were about 62,000 employees employed by juvenile institutions (chart 9).

Chart 9. State and local government juvenile institution output, labor, and productivity indexes, 1971-92

Index, 1971=100

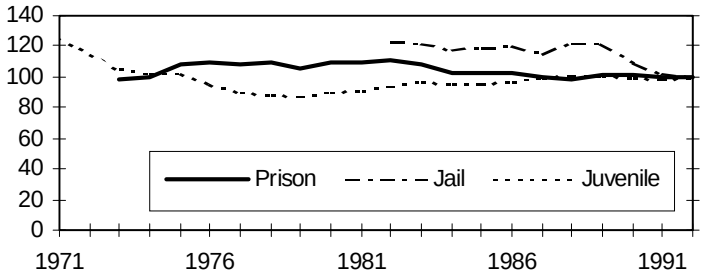


Comparison of the indexes

Comparison of average labor productivity for prisons, jails, and juvenile facilities for the years for which comparable data are available (1982-92), show decreases for prisons (1.0 percent) and jails (2.0 percent), and a small increase for juvenile facilities (0.6 percent). The long-term change varies depending on the period examined, as noted in chart 10.

Chart 10. Labor productivity indexes for State and local government prisons, jails and juvenile institutions, 1971-92

Index, 1992=100



Overall averages

Three functions—prisons, jails, and juvenile institutions—have been combined to produce a summary correctional institutional productivity index for 1973-92. The three functions, while different, share many of the same problems and operational concerns. Each provides food and shelter for offenders, each processes offenders in and out of the system, each provides security, and each provides some treatment and program services.

New output and labor indexes were generated to compute the correctional institution productivity index. Data for these indexes cover prison and juvenile institutions for the entire 1973-92 period, and jails for 1982-92. The covered periods are dictated by data availability. The output index was calculated by combining the outputs of the three services using labor weights for the base years of 1973, 1977, 1982, and 1987. The labor index uses the same benchmark years and simply reflects the employment levels of the three services. The productivity index was calculated by dividing the output index by the input index.

There were rapid increases in output and labor input between 1973 and 1992. The average annual increase in output is 5.0 percent with increases every year. Labor also increased every year. The long-term average annual increase in labor was 6.6 percent.

The summary correctional labor productivity index decreased at an average annual rate of 1.5 percent between 1973-92. However, the rate varies by the period examined. From 1973-82 productivity increased at an average annual rate of 0.5 percent. But, beginning in 1982, there was a decided decline with decreases every year from 1982. The average annual decline over the 1982-92 period was 3.3 percent. (See chart 11 and table 64.)

Chart 11. State and local government combined correctional institutions output, labor, and productivity indexes, 1973-92

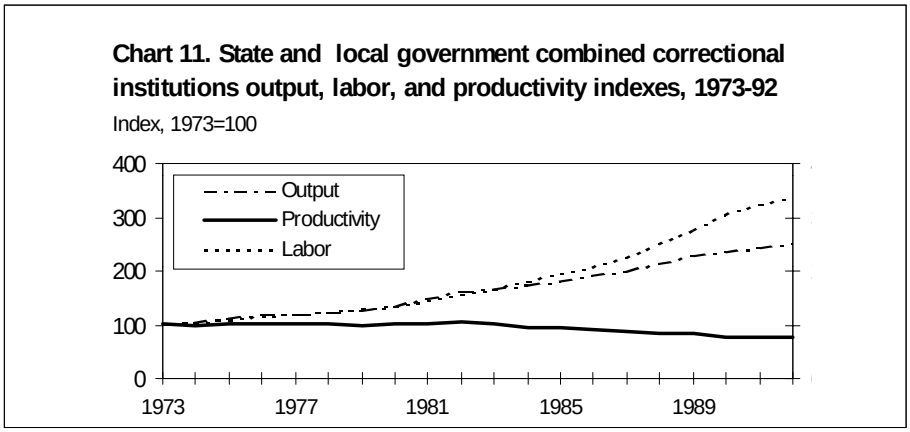


Table 64. Indexes of State and local government correctional institution output, input, and productivity, 1973-92
(1973 = 100)

Year	Output	Labor	Productivity
1973	100.0	100.0	100.0
1974	104.4	104.5	99.9
1975	113.2	109.5	103.4
1976	118.8	115.4	103.0
1977	121.8	119.9	101.5
1978	125.0	123.2	101.5
1979	128.4	131.5	97.7
1980	134.7	134.2	100.3
1981	148.1	145.4	101.9
1982	163.3	155.8	104.8
1983	168.9	167.2	101.1
1984	173.3	182.8	94.8
1985	182.0	195.5	93.1
1986	192.0	207.1	92.7
1987	199.7	225.7	88.4
1988	213.2	250.3	85.2
1989	228.3	276.6	82.5
1990	234.8	303.8	77.3
1991	242.0	322.5	75.0
1992	252.3	337.4	74.8
Average annual rate of change:			
1973-92	5.0	6.6	-1.5
1973-77	5.0	4.6	.4
1977-82	6.0	5.4	.6
1982-87	4.1	7.7	-3.3
1987-92	4.8	8.4	-3.3

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Chapter 5. State Employment Security Services

This chapter discusses labor productivity measurement of two, long-standing State government employment security services, the Unemployment Insurance pro gram and the Employment Service. The Unemployment Insurance (UI) program provides stipends for eligible unemployed workers. The Employment Service (ES) helps individuals obtain jobs. The Federal Government provides grants for administration of the programs and oversees their operations.

Although the two services are often operated out of the same office, they have very different goals, missions, objectives, and management. The UI is an income maintenance program supported largely by a tax on employers. UI State personnel screen applicants, certify their eligibility for assistance, and write checks. Most UI funds go to pay the unemployed. The Employment Service, on the other hand, is a job assistance program. Its staff tests client job skills, prepares job listings, and refers clients to job openings or training.

In 1992, these two services spent about $41 billion. UI expenditures were about $40 billion of which 94 percent was for unemployment benefits and the balance for administrative expenses. The $1 billion spent by ES covered program and administrative expenditures. Despite their long history, the UI and ES are relatively modest programs in terms of the number of employees, probably totaling fewer than 75,000 State employees in 1992.

These two programs are noted for their measurable outputs, available Federal data, past research, and Federal funding and interest. State government employees operate these joint Federal-State programs.

The first part of this chapter discusses the Unemployment Insurance program; this is followed by a discussion of the Employment Service. In each case, the program is briefly described, potential output measures are examined, data to calculate the indexes are presented, and indexes are calculated. The final section of the chapter combines the two services into a single employment security index.

Unemployment Insurance

Unemployment Insurance is a joint Federal-State program that has existed for over half a century. It has a specified mission, a clear cut set of outputs, and good national data. A number of studies have examined the program, and BLS published a national productivity index for several years. The following discussion reviews, updates, and summarizes some of the indexes that have been published for the UI.[1]

Institutional setting

The Social Security Act of 1935 established the UI program. The program's primary aim is to aid persons temporarily unemployed through no fault of their own. Another objective is to increase aggregate demand during times of rising unemployment to help stabilize the economy.[2] Federal laws and regulations set broad operational guidelines; State laws, regulations, and procedures govern day-to-day operations. Every State and some territories operate a UI program.

UI coverage is provided through several different programs (table 65). Three—the regular State program for unemployed workers, the program for unemployed ex-service members, and the program for unemployed Federal workers—comprise the bulk of the workload throughout the period examined here, 1964-92. In addition, several national programs operated for part of the period, including the extended benefit program, the temporary compensation program, the Federal supplemental benefit program,

and the Emergency Unemployment Compensation Program. Data from these programs are also included. Several special programs, including the Trade Adjustment Act and the Redwood Employees Protection program, also operated during this period, produce different outputs, and are too small to be included here. The regular State program is the backbone of the UI and normally accounts for most of the benefit expenditures.

Table 65. Selected Unemployment Insurance programs, 1935-92.

Program or law	Period covered
1. Regular State programs (UI-REG)/PL 74-271	1935 to present
2. Unemployment Compensation for Federal Employees (UCFE)/PL 83-767	1954 to present
3. Unemployment Compensation for Ex-servicemen (UCX)/PL 85-848	1958 to present
4. Extended Benefits (EB)/PL 91-373	1970 to present
5. Emergency Unemployment Compensation Act Temporary Compensation (TC)/PL 92-224	1971 - 1973
6. Federal Supplemental Benefits (FSB)/PL 93-572	1975 - 1978
7. Special Unemployment Assistance (SUA)/PL 93-576	1974 - 1978
8. Disaster Unemployment Assistance (DUA)/PL 93-288	1974 to present
9. Trade Adjustment Assistance (TAA)/PL 93-610	1974 to present
10. Federal Supplemental Compensation (FSC)/PL 97-248	1982 - 1985
11. Emergency Unemployment Compensation/PL 102-164	1991 - 1994

SOURCE: Paul L. Burgess and Jerry L. Kingston, *An Incentives Approach to Improving the Unemployment Compensation System*, Kalamazoo, Michigan: W.E. Upjohn Institute for Employment Research, 1987, pp. 82-4, and Saul J. Blaustein, *Unemployment Insurance in the United States, The First Half Century*, Kalamazoo, Michigan: W.E. Upjohn Institute for Employment Research, 1993.

The Unemployment Insurance program has two basic missions. One focuses on the unemployed, that is, screening applicants and paying those who qualify for support. The other focuses on funding or finances, that is, collecting taxes from employers to finance the program. In fiscal 1992, service to the unemployed, or beneficiary services, accounted for about 67 percent of the Unemployment Insurance program labor input; the funding or financial mission accounted for about 20 percent; and support and overhead, made up the remaining 13 percent.

Beneficiary services, or services to the unemployed, include screening applicants, determining their eligibility, hearing appeals, calculating benefit payments, and issuing checks. In FY 1992, 28.3 million claims were filed, and 223.4 million weeks of compensation were paid.

Applicant eligibility requirements are set by each State and include such considerations as the reason for leaving the job, wages required to qualify for unemployment insurance coverage, earnings from part-time work when drawing unemployment insurance, and the length of time worked to qualify. Also, each State sets its own rules for the weekly amount paid to recipients.

Financial services or tax collection, the other Unemployment Insurance mission, is a function of the number and type of employers. State governments collect taxes from employers to pay benefits to the unemployed, and the Federal Government, through the Internal Revenue Service, collects taxes from employers to pay administrative costs.

General Federal revenue pays benefits to unemployed veterans and Federal workers, and for some special programs, such as Emergency Unemployment Compensation and Supplementary Unemployment Assistance. Other special programs have been funded jointly by the Federal and State governments. Financial operations collect money from employers to support the UI payments, audit employers' records, and track down delinquent accounts. Most employers and employees are covered by UI operations. In 1992, 5.7 million employers were taxed to support UI programs. About 105 million individuals or 92 percent of the U.S. civilian labor force was covered.[3]

Unemployment Insurance costs exceeded $40 billion in 1992. Benefits were about $37.5 billion, and State administrative costs were about $2.5 billion. In addition, there was about $.3 billion in assorted Federal expenditures.[4] About 46,600 State staff years were devoted to UI operations in 1992.

Neither the Census of Governments nor the Standard Industrial Classification (SIC) system separately identify the UI program. The Census of Governments includes the UI program under the general category of Social Insurance Administration, while the SIC assigns the program to Industry 9441, Administration of Social, Manpower and Income Maintenance Programs.[5] That is, the *Standard Industrial Classification Manual* lumps the program with public welfare administration, equal employment opportunity offices, medical assistance program administration, and worker's compensation offices.

The data used to compute the UI indexes are taken primarily from those that are routinely collected by the U.S. Department of Labor.

Outputs

Selection of a measure to track Unemployment Insurance outputs is relatively straightforward, at least when compared with other government services. Although no research apparently addresses the issue, there are several obvious candidate measures:

Number of—

- Employees covered
- Employers covered
- Beneficiaries
- Compensated weeks
- Claims processed

In addition to these five measures, three others are also candidates for consideration:

- Benefit index
- Finance index
- Composite program index

Each measure is defined, its strengths and weaknesses are listed, and when appropriate, an index is presented for the measure. Chapter 2 presents the criteria used to evaluate each measure.

Number of employees covered

The number of employees measure is a count of persons who have earned wages in jobs covered by unemployment insurance. A similar measure is often used by the private insurance industry where "the number of policies sold" is a measure of output. The arguments for using this output measure are the following: (1) It is measurable; (2) it has been calculated for a number of years; (3) it is a physical measure; (4) it is easily understood; and (5) it is supported by good data.

The primary argument against using this measure is that it is not the final product of the UI. There is little connection between the number of persons covered and the resources required to operate the UI. Hence, this measure is not considered further in this discussion.

Number of employers covered

The number of employers measure is a count of the businesses, firms, and organizations, which have one or more individuals who are covered by unemployment insurance. General Motors Corp. and Montgomery County, MD, are examples of covered

employers. The arguments for using the number of employers as the UI output measure are similar to those noted in the preceding discussion. The primary argument against it as a measure is that there is little correlation between the number of employers and overall UI operations.

However, there is one part of the UI operation, the finance activity, where there is a close relationship between the number of employers and the work performed by the staff. The finance activity monitors employer's contributions, audits employer's records to ensure compliance with Federal and State laws, and attempts to collect monies owed on delinquent accounts. This part of the UI index, which is presented later, uses the number of employers as the basis for its calculations.

Number of beneficiaries

The number of beneficiaries is the number of individuals who draw unemployment insurance benefits. There are several variations of this measure: The total number of different individuals (one person may draw unemployment benefits several times during a year); the number of different times a person is assisted during the course of a year; and the number of claims. Claimants and beneficiaries, though closely related, are not synonymous; individuals can file claims but do not become beneficiaries until the claim is approved.

The number of beneficiaries is measurable, repetitive, and easily understood and data are available with which to calculate an index. This measure is sometimes used as an output measure of the UI program.

However, the measure fails to take into account the length of time an individual draws unemployment insurance. During periods of high unemployment, the average length of unemployment increases and the number of tasks (check writing, recertifications, and appeals) associated with the maintenance of a person collecting unemployment compensation also increases. These tasks require additional labor, which is not accounted for in this measure. Because of this weakness a different measure is used in the calculations.

Number of compensated weeks

A measure which takes into account the length of time unemployment insurance is drawn, as well as the number of people drawing insurance, is the number of compensated or beneficiary weeks. This measure is the aggregate number of weeks for which unemployment insurance is paid during a given period, such as a year.

One variation of the number of compensated weeks is the "average weekly number of beneficiaries" for a year, which is simply the total divided by 52. Another is the "average weekly insured unemployed (AWIU)," which includes all eligible persons claiming at least 1 week of unemployment insurance during the reporting period.

The number of compensated weeks is sometimes used as the preferred output measure for unemployment insurance. It is measurable, repetitive, accurate, and comparable through time and different State unemployment insurance levels don't affect it. Also, it is an easily understood, unitary measure and data exist which can be used to calculate an output index for a number of years.

The primary argument against this measure is that compensation is only part of the UI program. Other parts are financing and application. However, the number of compensated weeks paid does reflect an important part of UI staff work, and it is included as part of the program index presented below.

The count of the number of compensated weeks is extremely susceptible to the time period examined. In 1964, there were 79.8 million compensated weeks paid; in 1992 the figure had increased to 223.4 million. But, the annual statistic has been as low as 49.2 million in 1969 and as high as 260 million in 1976. The average annual increase between 1964 and 1992 is 3.7 percent (table 66).

Number of claims processed

Claim processing is the activity whereby applications for unemployment insurance are taken by the UI staff. Not every claim leads to a UI payment, but most do. Hence, processing of a claim is a necessary but not a sufficient condition to issue a UI check. Claim processing is an activity that needs to be included in any calculation of UI output,

but it is not an adequate measure of total UI output in and of itself.

As discussed earlier, there were several different types of UI programs during the covered period: State, Federal, veteran's, special unemployment assistance, Federal supplementary compensation, and Federal supplementary benefits. Application processing time varies by UI program. Applications for the regular UI program take about half the time to process as a Federal claim.

In addition, if a beneficiary experiences a second term of unemployment during the same benefit year, an additional claim must be filed. Because much of the required information is already on file and has been verified, the time required to process an additional claim is about one-quarter of the initial claim. In some years, additional claims are almost one-third of total claims.

There were 15.3 million initial claims filed in 1964 and 18.6 million in 1992, but in 1975, 30.3 million were filed. There were only 10.5 million initial claims in 1969. The number of *additional* claims has ranged from a high of 13.6 million in 1982 to a low of 6.1 million in 1989.

Because of the number of different types of claims and the difference in the time to process each type, a labor weighted claims index has been prepared to reflect claims processing operations. That is, initial and additional claims for UI programs are separately weighted by their processing time before being combined into a single index. The results of these computations show that the average annual increase in the weighted index is 1.7 percent for 1964-92 (table 66). The unweighted figure is 2.2 percent.

Benefit index

A good case can be made for dividing UI outputs into two parts: service to the unemployed, that is, those applying for and drawing benefits and finance, or tax collection activities, that is, those activities that relate to the financing of UI operations. This section discusses the benefit index.

Service to the unemployed is a function of the number applying for and the number drawing UI benefits. The number of claims processed weighted by program and type of claim is used to measure the number of claims. Benefits are a measure of the number of weeks compensated. These output indexes are combined using staff year labor weights to produce the benefit index.

The average annual increase in the benefit index between 1964 and 1992 is 2.7 percent (table 66).

Finance index

The other part of UI operations is the collection of funds to pay beneficiaries and operate the program. As noted above, this part of UI operations monitors employers' contributions, audits employer's records, and attempts to collect monies owed on delinquent accounts. One approach to measuring finance operations is to measure each of the activities and weight and combine them to create the finance index. This is a fairly laborious task given the nature of the work, and it is questionable as to whether the data are available with which to make such calculations.

Hence, the approach used here is to count the number of employers. Because there is a close relationship between the number of employers and the work performed by the UI finance or employer activity staff, this is a satisfactory proxy measure. Counts of the number of employers show that there has been a continuous increase in the number over the period covered by the index. In 1964 there were 2.4 million employers and by 1992 the figure had reached 5.7 million. The average annual increase was 3.2 percent, and every year shows an increase (table 66).

Program index

To measure total Unemployment Insurance program output, the output associated with service to the unemployed is combined with the output associated with finance operations. The procedure uses staff year labor weights to produce a weighted index of output for the entire Unemployment Insurance program. The results of this calculation show that output grew by 2.5 percent annually between 1964 and 1992 (table 66).

Comparison of output indexes

Eight measures of UI output have been discussed in this section. Indexes have been calculated for five of them: Claims processed, weeks compensated, benefits, finance, and total program. Comparison of the trends for the five indexes for 1964-92 show that weeks compensated grew most rapidly (3.7 percent), followed by finance (3.2 percent), benefit (2.7 percent), program (2.5 percent), and claims (1.7 percent). The benefit and program indexes show similar rates of growth because such a large part of the program index reflects the benefit index. In 1992, 67 percent of the direct labor was used to provide benefit payments.

The rate of growth of each index depends largely on the period examined. Rates have been calculated for seven periods. They are:

- 1964-92, the entire measured period,
- 1967-92, the period covered by the productivity indexes presented for most of the other indexes in this study, and
- 1967-72, 1972-76, 1976-80, 1980-83 and 1983-92, the peak periods for the measured program output.

Peak work periods for the UI program generally coincide with economic recessions. The business cycle troughs for the total economy for 1964-92 were 1970, 1975, 1980, 1982, and 1991 as determined by the National Bureau of Economic Research.

Several points stand out in these indexes. First, the period chosen can dramatically affect the rate of growth. With the exception of the finance index, the rate of change seems to depend as much on the time period chosen as on the index chosen. This is a reflection of the business cycle. Second, individual activity indexes often peak in different years. Although the benefit and program indexes peak in the same years, this is not the case for claims and weeks compensated. The peaks in claims processed usually lead the peaks in weeks compensated by about 1 year. Third, there is greater variability in weeks compensated than in claims processed. Fourth, there is very little difference between the rate of change in the benefit and program indexes, regardless of the period. Fifth, for most years, the program index falls between the benefit and finance indexes as expected. However, in 4 years, 1980-82 and 1992, the program index fell below the two other indexes. This counter-intuitive result reflects the large increase in the weeks compensated index, and the change in base year labor weights, which increased the relative influence of the claims processed index.

Quality of UI output

UI program quality output is often studied and discussed. It is an area that is thoroughly documented, and the national UI office has collected statistics on UI quality for several decades. Today, statistics are collected on several dozen quality variables, which are summarized and reported annually.[6] Although there is criticism of the UI quality measurement system, it is one of the few government programs that attempt to measure the quality of its output in a systematic manner.[7]

The question for this study of productivity is: how does quality affect UI output and, particularly, how should quality change be reflected in output trends? To affect output trends, two conditions must exist: First, output quality must be changing and second, the quality change must affect resource inputs. Some quality characteristics, such as courtesy and helpfulness of UI staff, are important to UI managers but probably do not affect resource requirements and thus do not directly concern this investigation. Other characteristics, such as error rates, could affect resource requirements but apparently are fairly stable through time.

A cursory review of UI quality measurements does not find an overall shift in UI output quality during the period covered here. Some measures show improvement, some deterioration, but overall there is little change. The output and productivity indexes presented here have not been adjusted to account for quality shifts.

Table 66. Comparison of five Unemployment Insurance output indexes, 1964-92.
(1964 = 100)

Fiscal year	Total program	Claims processed	Weeks compensated	Benefit	Finance
1964	100.0	100.0	100.0	100.0	100.0
1965	90.1	87.3	84.1	85.8	100.9
1966	79.7	74.5	66.3	70.5	102.4
1967	81.1	76.8	64.9	71.0	106.2
1968	80.7	74.0	66.8	70.3	106.2
1969	77.8	68.4	61.7	64.9	107.6
1970	90.8	87.5	80.3	83.7	111.1
1971	115.6	111.3	137.5	122.1	112.4
1972	119.5	110.6	146.2	125.7	117.2
1973	108.1	89.0	110.8	97.9	153.2
1974	116.4	102.4	115.7	107.2	159.8
1975	193.7	191.8	241.9	212.5	163.8
1976	219.5	183.3	325.9	246.9	167.2
1977	184.9	167.3	237.1	197.4	172.9
1978	146.0	131.9	161.1	144.4	183.0
1979	136.3	124.8	136.8	129.7	191.6
1980	171.8	159.3	194.9	174.5	197.0
1981	167.5	144.0	200.7	168.5	198.7
1982	198.2	182.7	240.2	207.4	201.9
1983	218.4	177.8	301.9	233.5	203.4
1984	153.6	129.9	171.8	147.9	206.8
1985	153.0	131.7	162.7	144.7	216.4
1986	148.1	123.9	155.6	137.3	219.9
1987	140.0	111.9	142.8	125.0	226.8
1988	133.2	104.1	122.3	111.8	232.6
1989	133.5	104.9	120.8	111.6	234.3
1990	144.5	117.8	139.9	127.1	238.4
1991	168.4	143.4	192.0	164.1	239.9
1992	199.2	160.6	280.0	211.6	242.1
Average annual percent change:					
1964-92	2.5	1.7	3.7	2.7	3.2
1967-92	3.7	3.0	6.0	4.5	3.4
1967-72	2.2	1.3	4.9	2.9	2.0
1972-76	16.4	13.5	22.2	18.4	9.3
1976-80	-5.9	-3.4	-12.1	-8.3	3.3
1980-83	8.3	3.7	15.7	10.2	1.1
1983-92	-1.0	-1.1	-.8	-1.2	2.0

Labor inputs

UI program operations are very labor intensive. About 80 percent of all administrative funds go to pay employee salaries and benefits. Building rents, computer leases, telephone, postage, and the like account for the remaining 20 percent. All operating personnel are State government employees. In addition to the State employees, there are about 150 Federal Government employees who oversee and coordinate State activities, but they are not included in the labor or cost figures presented in this bulletin.

Two labor measures are recommended for calculating State and local government labor productivity—total employment and the number of full-time-equivalent employ-

ees. The data used in this section for computational purposes are the actual number of UI State filled positions (taken from accounting reports). State labor officials report these data to the U.S. Department of Labor. The number of positions is equivalent to an FTE, and is used to budget for UI programs and to account for funds allocated to the States. The trend computed from the number of State filled positions would approximate an hours trend if it were possible to compute that index. However, data are not available with which to calculate an index of the total number of full-time and part-time UI employees.

The total number of UI positions increased from 32,212 in 1964 to 46,465 in 1992. The average annual rate of increase between 1964 and 1992 is 1.3 percent, with major fluctuations following workload shifts (table 67). The number of staff years ranged from a low of 26,070 in 1967 to a high of 57,208 in 1976.[8]

The labor statistics presented here support the basic unemployment insurance program including the regular State program, Federal, Ex-service Members, Extended Benefits, Supplementary Benefits, Special Unemployment, and Temporary Compensation (table 67). Positions for trade adjustment assistance, disaster unemployment assistance, and redwood assistance have been removed from the totals because outputs for these programs are not included in the program outputs presented in this bulletin.

Table 67. Number and index of State UI labor positions, 1964-92.
(1964 = 100)

Fiscal year	Number	Index
1964	32,212	100.0
1965	31,543	97.9
1966	27,602	85.7
1967	26,070	80.9
1968	27,334	84.9
1969	27,016	83.9
1970	28,489	88.4
1971	31,884	99.0
1972	37,799	117.3
1973	34,581	107.4
1974	32,711	101.5
1975	44,528	138.2
1976	57,208	177.6
1977	55,125	171.1
1978	49,070	152.2
1979	48,684	151.1
1980	48,673	151.1
1981	51,350	159.4
1982	52,907	164.2
1983	56,351	174.9
1984	46,512	144.4
1985	44,652	138.6
1986	41,336	128.3
1987	39,778	123.5
1988	38,581	119.8
1989	38,527	119.6
1990	37,849	117.5
1991	40,764	126.5
1992	46,465	144.2
Average annual percent change:		
1964-1992	—	1.3
1967-1992	—	2.3

NOTE: Excludes disaster, trade adjustment, and redwood program personnel.

Position data are available by function for the UI system for a number of years. The UI program has a base staff year level that does not vary significantly nationally. The contingency staff year level is adjusted in accordance with the workload. Major fluctuations in personnel can follow shifts in workload.

Labor indexes were also calculated for the individual output functions discussed in the preceding section, that is, claims processed, weeks compensated, benefits (claims and compensation), and finance (table 68). In each instance, the labor indexes reflect only the *direct* labor used to produce the functional output indexes (table 66). Support staff are not assigned by function, and it is not possible to make such an assignment in any reasonable fashion. Because the direct-indirect labor ratio varies through time, the rate of change and the total amount of labor covered by these functional indexes is different from the overall UI labor index presented in table 67.

Table 68. Four UI direct labor indexes, 1964-92.
(1964 = 100)

Fiscal year	Claims processed	Weeks compensated	Benefit	Finance
1964	100.0	100.0	100.0	100.0
1965	94.3	90.0	91.2	100.3
1966	81.7	77.7	78.9	102.4
1967	77.6	71.9	73.5	100.1
1968	79.5	74.1	75.7	99.4
1969	74.9	71.1	72.1	99.7
1970	86.2	74.3	77.7	102.2
1971	130.3	108.3	114.5	96.6
1972	142.5	122.1	127.9	107.5
1973	112.8	102.0	105.1	116.8
1974	117.8	96.1	102.3	112.3
1975	251.6	156.5	183.5	111.2
1976	278.7	199.3	221.9	119.8
1977	240.2	187.0	202.1	124.7
1978	187.5	162.2	169.4	124.4
1979	158.0	144.2	148.1	126.3
1980	197.7	179.8	184.9	137.0
1981	182.2	171.3	174.6	138.5
1982	217.1	191.8	198.8	140.4
1983	219.1	190.6	198.4	134.4
1984	149.0	129.1	134.5	133.3
1985	160.1	136.8	143.1	134.0
1986	138.2	120.0	125.0	137.0
1987	142.6	115.6	122.7	142.8
1988	124.5	109.1	113.3	148.2
1989	128.2	108.6	113.9	148.3
1990	124.4	105.4	110.5	150.8
1991	143.6	118.6	125.3	154.0
1992	179.1	146.7	155.3	153.8
Average annual percent change:				
1964-92	2.1	1.4	1.6	1.6
1967-92	3.4	2.9	3.0	1.7

The fact that the benefit and finance labor indexes increased at the same average annual rate of 1.6 percent between 1964-92 is largely happenstance; the 1967-92 years yield very different growth rates. Examination of the individual functional indexes reveal that the finance labor index increased at a fairly steady rate between 1964-92. The benefit labor index, on the other hand, registered wide fluctuations reflecting the fluctuations in workload in claim processing and weeks compensated. The long-term average annual increase in claims processed is 2.1 percent and weeks compensated is 1.4 percent. But it is the large number of year-to-year fluctuations that is the most interesting aspect of these indexes (table 68).

Productivity trends

UI program output per employee increased 1.2 percent annually between 1964-92, and 1.3 percent between 1967-92. The rates of growth are directly affected by changes in the economy, and, in particular, by the changes in insured unemployment. Most interesting are the large year-to-year fluctuations and cyclical movements. From 1967 through 1992, there were changes in output per employee year of 10 percent or more in 12 of the 25 measured years (table 69).

Examination of the five output cycles between 1967-92 (1967-72, 1972-76, 1976-80, 1980-83, and 1983-92) shows that output per employee year generally rose as output increased, although obviously not at the same rate. Although staff was added, they were not added as rapidly as output increased. The result is increasing output per employee year. The opposite seems to have happened as output dropped. What is most noteworthy about this process is that, in most cases, staff were added during the upswing of the output cycles and cutback on the downside, a phenomenon common in the private sector, but not usually found in public operations.

Output per employee year was also calculated for the four UI functions—benefits, claims, weeks compensated and finance—for which we calculated output and labor indexes. The labor indexes, as noted earlier, reflect *direct* labor only. Computations of output per employee year show that the benefit index increased at about the same rate as the overall UI index (1.4 versus 1.3 percent per year for 1967-92). However, the two parts of the benefit index, claims processed and weeks compensated, show very different movements. The claims output per employee year index declined (-0.4) over the 1967-92 period, and showed relatively minor year-to-year fluctuations. The weeks compensated index, on the other hand, showed moderate rates of growth (3.0) and considerable fluctuations from year to year. Finally, the finance index shows a modest rate of growth with an average annual increase between 1967-92 of 1.6 percent. However, even this index shows two distinct periods of change. From 1967 through 1975, output per employee year increased at an average annual rate of 4.2 percent, but since then the average annual increase was only 0.4 percent (table 70).

Table 69. Unemployment Insurance productivity index, 1964-92.
(1964 =100)

Fiscal year	Output	Employee positions	Output per employee
1964	100.0	100.0	100.0
1965	90.1	97.9	92.0
1966	79.7	85.7	93.0
1967	81.1	80.9	100.2
1968	80.7	84.9	95.1
1969	77.8	83.9	92.8
1970	90.8	88.4	102.7
1971	115.6	99.0	116.8
1972	119.5	117.3	101.8
1973	108.1	107.4	100.7
1974	116.4	101.5	114.6
1975	193.7	138.2	140.2
1976	219.5	177.6	123.6
1977	184.9	171.1	108.1
1978	146.0	152.3	95.8
1979	136.3	151.1	90.2
1980	171.8	151.1	113.7
1981	167.5	159.4	105.1
1982	198.2	164.2	120.7
1983	218.4	174.9	124.8
1984	153.6	144.4	106.4
1985	153.0	138.6	110.4
1986	148.1	128.3	115.4
1987	140.0	123.5	113.4
1988	133.2	119.8	111.2
1989	133.5	119.6	111.6
1990	144.5	117.5	123.0
1991	168.4	126.5	133.0
1992	199.2	144.2	138.1
Average annual percent change:			
1964-92	2.5	1.3	1.2
1967-92	3.7	2.3	1.3
1967-72	8.1	7.7	.3
1972-76	16.4	10.9	5.0
1976-80	-5.9	-4.0	-2.1
1980-83	8.3	5.0	3.2
1983-92	-1.0	-2.1	1.1

Table 70. Comparison of four UI direct labor productivity indexes, 1964-92
(1964 = 100)

Fiscal year	Claims processed	Weeks compensated	Benefit	Finance
1964	100.0	100.0	100.0	100.0
1965	92.6	93.5	94.0	100.5
1966	91.2	85.3	89.4	100.0
1967	98.9	90.3	96.5	106.0
1968	93.1	90.1	92.9	106.8
1969	91.4	86.7	90.0	108.0
1970	101.5	108.1	107.7	108.7
1971	85.4	127.0	106.6	116.3
1972	77.6	119.8	98.3	109.0
1973	78.9	108.6	93.2	131.2
1974	86.9	120.4	104.9	142.2
1975	76.2	154.6	115.8	147.4
1976	65.8	163.5	111.3	139.6
1977	69.6	126.8	97.6	138.7
1978	70.4	99.3	85.2	147.1
1979	79.0	94.8	87.6	151.7
1980	80.6	108.4	94.4	143.7
1981	79.1	117.2	96.5	143.4
1982	84.2	125.2	104.4	143.8
1983	81.2	158.3	117.7	151.4
1984	87.1	133.1	110.0	155.1
1985	82.3	118.9	101.1	161.5
1986	89.7	129.7	109.9	160.6
1987	78.4	123.5	101.9	158.9
1988	83.6	112.2	98.7	156.9
1989	81.8	111.2	98.0	158.0
1990	94.7	132.7	115.1	158.1
1991	99.8	161.9	131.0	155.7
1992	89.7	190.9	136.3	157.5
Average annual percent change:				
1964-92	-0.4	2.3	1.1	1.6
1967-92	-.4	3.0	1.4	1.6
1967-72	-4.7	5.8	.4	.6
1972-76	-4.0	8.1	3.2	6.4
1976-80	5.2	-9.8	-4.0	.7
1980-83	.2	13.4	7.6	1.8
1983-92	1.1	2.1	1.6	.4

Employment Service

The U.S. Employment Service (ES), like the UI, is a joint Federal-State program that has operated for decades. As with the UI, the Federal Government provides general operating guidelines, oversight, and financing, and the States operate the Service. But the ES goal, mission, objectives, and operations are quite different from those of the UI. The basic goal of the Employment Service is to assist individuals, employed and unemployed, in finding jobs. In addition, it has several, ancillary missions. But the emphasis has shifted with the passage of time. Indeed, a few of the institutions, some of the tasks, and many of the procedures discussed here have been modified and in some cases eliminated. The following is a brief overview of the ES and how it operated until 1987.

Institutional setting

Although the origin of the ES is open to debate, the name dates from World War I when the U.S. Employment Service was established to recruit defense workers. The ES languished following the war, but was given new life by the great depression. The Wagner-Peyser Act of 1933 formally established the joint Federal-State operation. Then, the primary function of the ES was to refer unemployed workers to work relief programs. The Social Security Act of 1935 established the unemployment insurance program, which called for a work test as a condition for receiving unemployment payments. The ES was assigned responsibility for administering that test. In the 1940s and 1950s, the ES recruited and referred workers to the defense program, and later helped veterans and defense workers return to civilian employment.[9]

The focus of the ES shifted in the 1960s to assisting the disadvantaged and registering welfare recipients. During much of the 1970s, the ES screened, tested, and referred applicants to Federally sponsored job training programs. The work emphasis shifted in 1982 when many programs were transferred to the Job Training Partnership Act program. At this point, the ES returned to its traditional labor exchange operations, although the registration function (work tests) remained.

Although the ES has returned to its basic roots over the past decade, it has undergone considerable restructuring and downsizing. In 1979 there were about 2,600 ES offices and 30,000 State employees.[10] By 1987 these numbers had dropped to 1,800 offices and approximately 26,000 employees.[11] More recent figures suggest that the number of offices and employees continue to shrink.[12] Additional State employees work on ES responsibilities specified by the AFDC and food stamp programs, and Federal labor contracts.

Since 1933, the Employment Service has had three primary functions: Place people in jobs (labor exchange), enforce laws and regulations (compliance and enforcement), and provide statistical data (labor market information). More information is provided on these functions later. The majority of the funding and staffing is devoted to the first function, labor exchange, the focus of this study. In 1987, labor exchange activities accounted for 91 percent of ES trust fund expenditures; compliance and enforcement accounted for about 4.5 percent; and labor market information accounted for about 4.5 percent. Detailed analysis of ES expenditures in the latter part of the 1970s found a similar division.[13]

Funding for the traditional ES program comes from a tax on employers (Federal Unemployment Tax Act). Monies for some of the nontraditional ES programs, such as the work test, come from general tax revenue, and when the ES supports other government programs, it is often funded under a reimbursable agreement. These programs include Disabled Veteran's Outreach, Local Veteran's Employment Representative, Targeted Job Placement Credit, Job Training Partnership Act, Food Stamps, Dislocated Workers, Migrant and Seasonal Farm Workers, Disaster Related Funds, and Trade Assistance Act.

Until 1984, the Department of Labor distributed funds to the individual States to support their projected ES workload. That is, monies were provided to support the traditional program staff; administrative, supervisory, and technical (AS&T) staff; labor market information staff; special project staff; and nonpersonal services such as

space, utilities, computers, and travel. The budget was built from the ground up. Starting in 1982, the Wagner-Peyser amendments changed the way funds are distributed. The old method funded the number of staff years needed in each State to cover the projected workload. The new method distributes the funds based on each State's civilian labor force and its relative share of the Nation's unemployment. State officials are permitted to shift the funds among resource categories as needed. These procedures are for labor exchange services. Activities that are not part of the basic labor exchange services, such as those covered by the Trade Assistance Act, are supported through separate funding.

Following is a discussion of the three primary ES functions.

Labor market information is needed to support many ES activities, local, State, and national. This function includes the collection of data on employment, hours and earnings, local area unemployment, occupational employment, insured employment, and wage statistics. The national labor information program also includes the maintenance of the *Dictionary of Occupational Titles*, collection of data on permanent plant layoffs, and closings and maintenance of the job bank openings information file.

The *compliance and enforcement* function is the responsibility of the national office staff, but State employees perform the services. Several different activities comprise this function including certification of housing and pay of migrant workers, and documentation and certification of the need for alien workers.[14]

Labor exchange services are provided by State Employment Service staff and are the focus of this study. Five services, which account for the bulk of ES expenditures, are used here. The first service is employer-centered while the last four are client-focused.

- Identifying job openings and providing employer services
- Registering and interviewing job seekers
- Counseling applicants
- Testing applicants
- Matching job applications with openings and referring qualified applicants to employers.

Identifying job openings, accepting job orders, and contacting employers to solicit orders (job development) are employer-based activities. Employers are reached by personal visits, telephone calls, mail, and promotional activities. Job listings are entered into computerized job banks daily. Almost 7.0 million job openings were listed in fiscal 1987, the last year of the index.

The first step for most clients entering the ES process is an interview during which an application is taken. The interview identifies the client's job skills, knowledge, and interests. Approximately 19.2 million applications were taken in fiscal 1987.

Counseling is available to those who need assistance in choosing a field of work, who wish to change their occupation, or who have difficulty in holding a job. In fiscal 1987, over 600,000 applicants received job counseling.

Tests are sometimes given to the applicants to assess their skill level. Applicants who do not have a trade or occupation, or who wish to change occupations, may take general aptitude, specific aptitude, or general interest tests. The ES administered about 800,000 tests in fiscal 1982, the last year for which test data are available.

The last step in the ES process is job matching and referral of applicants to employers. In fiscal 1987, the ES made about 12.5 million referrals, which resulted in 4.5 million hires or job placements.

National data on ES operations, resources, and outputs is quite varied, ranging from modest to expansive. There have always been some data, and for some years there have been massive amounts. The National ES Office has collected and published some output statistics since the late 1930s.[15] In the 1970s there was a major move to expand the data collection effort. Two basic data systems were developed: one to collect program information, the other to collect resource and cost information. Both systems collected

data at the local ES office, aggregated them at the State level, and summarized them at the national level.

Beginning in 1984, the States were no longer required to supply detailed data to the national ES office, and it was left up to the individual States as to whether they would continue to collect and use the information themselves. This resulted in a dramatic cutback in national information available on operations of the Employment Service. However, some basic program information continued to be collected by the national office.

The productivity statistics presented here are a function of these data collection efforts. As discussed later, the indexes are restricted to the 1972-87 period.

Neither the Census of Governments nor the Standard Industrial Classification (SIC) system separately identify the ES program. The Census of Governments includes the ES program under the general category of Social Insurance Administration while the SIC assigns the program to Industry #7361, Employment Agencies. The SIC category includes:

> Establishments primarily engaged in providing employment services except theatrical employment agencies and motion picture casting bureaus. Establishments classified here may assist either employers or those seeking employment.[16]

State administrative offices apparently are assigned to Industry 9441, Administration of Social, Manpower, and Income Maintenance programs.[17]

Outputs

Employment Service output can be measured in a variety of ways, three of which are looked at here: Placements, referrals, and services. Placements occur each time that an employer hires an applicant who is referred by the ES. Referrals take place when an applicant is identified, matched, and referred to a job opening. Services are the activities that are conducted by the ES staff, which result in job referrals and placements. Chapter 2 provides the criteria used to evaluate these measures.

Before the three measures are reviewed, two issues common to each measure are discussed. First, are transactions or individuals counted? And second, how are agricultural activities counted?

Transactions versus individuals. Most Employment Service records present outputs or services in two ways, first as a transaction and second as an individual. A transaction is recorded each time a service is rendered, for example, each time a job placement is made or a test is administered. On the other hand, an individual count is recorded the first time that an individual receives the service within a fiscal year. Repeat service within the same fiscal year is not counted.

Some researchers and ES administrators feel that the number of individuals is a better measure of operations than the number of transactions because the primary ES effort is expended in the initial registration, counseling, and testing. The rationale is that a registered applicant taking an intermittent job requires little ES time to reprocess.

Others feel that a transaction count is a better measure for two reasons. First, even though individuals may not require as much processing work in subsequent visits, as they did in the first, they do require some effort. One study found that costs were more directly related to transaction operations than to the number of individuals served.[18] Second, the data on transactions are likely to be somewhat more accurate than those collected on individuals since there is no problem in maintaining and matching transaction records. This can be a real problem with individual records.

The measures and data that are used here focus on transactions. However, casual examination of the data suggest that there is not much difference in the long-term trends between the two approaches.

Agricultural versus non-agricultural. The second issue that needs to be addressed is the role of agriculture, and how it is to be handled. Agricultural work played a major

role in ES operations at one time. For example, agricultural placements accounted for 62 percent of total ES placements in 1960. By 1970, placements were evenly divided, but by 1979 agricultural placements made up only 6 percent of the total. This would not be an issue except that the work processes used by the ES were quite different for agricultural and non-agricultural operations.

The Senate budget hearings of 1968 highlighted this issue. The hearings noted that agriculture placements were in the thousands per staff year for three States while nonagricultural placements were in the hundreds. Very different processes were occurring when agricultural and non-agricultural placements were made.

The primary problem with agricultural placements was the mass placement, which relied on crew leaders to recruit workers. Each leader would recruit 30-50 workers, each of whom was counted as a placement. Mass placements represented 79 percent of all agricultural placement transactions in 1975, but by 1980, these placements had dropped to less than 2 percent.

Prior to 1982, the ES maintained separate agricultural and non-agricultural placement records. Thus, it is possible, prior to 1982, to calculate and weight outputs separately for agricultural and non-agricultural operations, and this is the procedure we use here. Beginning in 1982, no distinction is made in the calculations between agricultural and non-agricultural data.

Placements

Of the three basic types of output measures, placements is the one that seems to be most often used. The ES has collected statistics on the number of placements since 1938; it tracks the number of placements monthly; and it includes the number of placements as part of its annual budget justification.

A placement occurs each time that an employer hires an applicant who is referred by ES. For a placement to be recorded, five steps must take place:

1. A job order form must be prepared before the referral is made;
2. Arrangements must be made with the employer for the referral of an individual or individuals;
3. The employer must not have specifically requested the individual;
4. A reliable source, preferably the employer, must verify that the individual began work; and
5. The placement must be recorded on ES forms.[19]

The basic argument for using placements to measure ES output is that placing individuals in jobs is the role of the Service. Counseling, job bank operations, registration of workers, and testing clients all support the basic service of getting jobs for individuals. Furthermore, placements are measurable, repetitive, and easily understood. They are physical measures, and data exist to make the measurements.

The principle arguments against the use of placements are: 1) The ES has other work tasks in addition to placing individuals; 2) a placement is an outcome, not a final output; 3) the placement data are questionable; and 4) the duration of the job needs to be considered. Each is discussed briefly.

Other work tasks. Some of the ES labor market activities, such as job referrals, are necessary for placements to occur. Others, such as counseling and testing, may or may not help in placing individuals. The unemployment insurance program, irrespective of any other action, requires others, such as registration.

Outcome issues. The outcome issue is more troublesome and it is avoided for several reasons. First, productivity measurement is concerned with production. Second, outcomes are heavily influenced by external factors, considerations over which managers have little control. As the ES demonstrates, when the economy is booming, and hiring is the norm, placing individuals in jobs is relatively easy, but in a declining economy with high unemployment, placing individuals is difficult. Although the state of the

economy is the most crucial external factor for ES operations, there are other considerations too, such as the size of the local labor force, skills requested by employers, and the availability of the needed skills in the labor force.

The research community generally agrees that ES placements are influenced more by factors external to ES operations, particularly the state of the economy, than by ES operations. According to one study:

> The State's unemployment rate consistently yields the highest correlation (negative) with placements. Adding a measure of new hires and a measure of the percentage of the work force in lower level jobs boosts the total variance accounted for to 40 to 45 percent of the total variance in placements. Adding certain additional independent variables to the equation consistently increases the variance accounted for to 60 to 70 percent of the total.[20]

Other studies also found external variables to be extremely important in explaining placement variance.[21]

Placement data. The third criticism of placements as a measure of ES output concerns the placement data themselves. Considerable data are collected on placements, but there are a number of questions concerning their accuracy.[22] The issue is not whether there are errors, but the magnitude of the errors and whether they introduce bias into the placement statistics.

Job duration. The fourth criticism is the manner in which placements are calculated. The issue here is the length of the placement, a proxy measure for its quality. A placement can be for a few hours, several days, or for years.

The ES recognizes the importance of the length of the placement, and since the mid-1970s it has collected and published placement statistics by job duration—less than 3 days, 3 to 150 days, and more than 150 days. In 1970, 72 percent of the ES placements were to jobs expected to last over 150 days. This percentage increased to 76 percent in 1973 and dropped to 71 percent in 1976. Starting in 1991, only the number of individuals placed in jobs expected to last over 150 days were reported separately. In 1990, the General Accounting Office (GAO) identified 400 local offices that placed most people in temporary jobs and another 400 offices that placed 3 out of 4 persons in permanent jobs.[23]

The question for productivity measurement is whether resource requirements vary significantly by expected job duration. That is, is more ES employee time spent on placing a person in a long-term position than in a short-term one? No research was found which addressed this question at the national level. The statistics presented here do not separate placements by expected job duration.

Irrespective of the questions concerning the use of placements as the measure of ES output, it is the most widely used measure, and for that reason a placement transaction index has been produced. The index reflects the sum of the non-agriculture placement transactions and the weighted agricultural placement transactions for 1972-82, and the non-agricultural placement transactions for 1982-87. The two indexes are linked in 1982. The average annual increase over the 1972-87 period is 1.0 percent (table 73).

Referrals

In several respects, referrals are a better measure of ES output than placements for they are less affected by external economic considerations. A referral takes place each time an applicant is identified, matched, and referred to an opening. A referral has to take place before a placement can take place.

Arguments in favor of using referrals as the measure of output are that the number of referrals is a measure of final output, it is measurable, it is repetitive, and it reflects the work of ES employees. Using referrals as the measure of output avoids the verification and some of the external economic considerations that are endemic to placements. A

count of transaction referrals captures the additional work needed for hard-to-place individuals and for repeat processing of workers in temporary or intermittent jobs. Not all referrals, however, lead to jobs, and not all referrals are to job openings. The ES also refers applicants to training and to support services such as counseling and testing.

Arguments against the use of referrals as the measure of ES output are fourfold. First, they do not capture all ES services. That is, intake, testing, and counseling are not explicitly counted. For example, an ES client can be counseled or tested without being referred to a job. Second, referrals are affected by external economic conditions, like placements, although not to as great an extent. Third, there are no estimates of the accuracy of the referral data. It is possible, for example, to manipulate the referral statistics by referring individuals to multiple job openings. Fourth, national data for some years are missing and/or are incomplete.

To construct a referral index for 1972-87, a proxy count was used for several years. Referral data are not available for 1972-75 and 1982-86. For these years the placement rate of change is used to estimate referral trends. For 1986-87, referral data are again available and used. By linking the individual segments of the referral output index, that is, 1972-75, 1975-82, 1982-86, and 1986-87, creates an index covering 1972-87. The average annual increase over the 1972-87 period is 0.9 percent (table 73).

Services

Exchange services, the third possible ES output measure, is comprised of two basic groups of services, those for employers and those for applicants. Employer services include labor exchange and technical assistance. Applicant services include intake, counseling, testing, and referrals. Law and/or ES regulation require both employer and applicant services, and all are integral parts of ES operations. The suggested service measures for employers and applicants are presented in table 71.

Employer services

For purposes of discussion, employer services are divided into two parts, technical services and labor exchange support services. *Technical services* help employers by providing information on legislation affecting their activities, developing occupational tests for employment use, assisting with recruitment, and helping with affirmative action planning. Employer technical services are a small part of ES operations. In 1975, the last year for which data are available on ES staff by individual activity, they accounted for only 0.5 percent of all ES employees. Given their apparent small role and the lack of data to measure their output, they are not considered further.

Labor exchange support services focus on making job development contacts and taking job orders. Job development is the process whereby ES staff obtains job listings from employers. In some cases this requires general canvassing of potential employers for actual and potential job openings; in other instances it requires searching for a specific job for a specific individual.

Job orders is the process of taking and listing of employer initiated requests for job applicants. Employment Service staff is obligated to process job orders regardless of whether suitable applicants are available to fill them. According to data for 1975, the taking of job orders accounted for about 9 percent of all ES employment. However, during times of economic growth, an even greater proportion of ES staff is used to take job orders.

A number of different measures have been proposed to track employer services (table 71). The only measure used in this bulletin is the number of job orders listed with ES. It is measurable, relatively straightforward, data have long been collected and are readily available, and it is the primary activity of the employer services.

The average annual change in job openings between 1972 and 1987 is -0.4 (table 72). The trends evident in this index are a reflection of the business cycle and the downsizing of ES operations. The last year of the index, 1987, the ES recorded about 7 million job openings.

Table 71. Candidate output measures for ES services

Service	Measures with variations
Employer services	
Labor exchange	Number of job orders taken Number of job development contacts
Technical assistance	Number of employers assisted Number of services rendered Number of tests developed Number of requests handled
Applicant services	
Intake	Number of active applicants Number of applications taken New application Renewal application Partial application Number of individuals registered New application Renewal application Partial application
Counseling	Number of people counseled In a group setting In a one-on-one session Number of counseling transactions In a group setting In a one-on-one session
Testing	Number of people tested in a group session Proficiency test Skills test Number of people tested in a one-on-one session Proficiency test Skills test
Referrals/placements	Number of referral transactions Number of individuals referred Number of placement transactions Number of individuals placed

Applicant services

Applicant services consist of four activities: Intake, counseling, testing, and referrals.

Intake, the first step in the application process, determines the applicant's job skills, education, knowledge, interests, and work experience; checks past applications; and refers the individual to the next step in the process. As part of the job application process the person may be referred to counseling or a training program.

The ES is required by law to register and provide service to several categories of applicants including many income maintenance recipients. Unemployment insurance applicants, for example, are required to register with the ES but the applicant may be attached to a former employer and thus not available for work, or the applicant may have job skills for which the ES has no requests. Nevertheless, registration is still required.

The obvious output measure for the intake process is the number of intakes, and that is the basic measure used here. It is measurable, easily understood, reflects the work of the activity, and data exist with which to calculate the measure.

The ES uses several different variations of the basic application. There is the first time (new application) and reapplication (renewal application). New applications are further distinguished between complete applications and partial applications. There are procedural variations for processing each of these types with different labor requirements for each. Estimates show that the partial new application and the renewal application take about half the labor time required to process an entirely new application. Hence, the need to differentiate the different types of intakes.

One problem in differentiating intake is that the required data are available for only part of the measured period. The procedure used here is dictated by data availability. The 1972-75 segment reflects the number of individuals filing new applications. The 1975-82 period differentiates new applications, new partial applications, and renewal applications, and weights each to calculate an annual index. The 1982-87 segment reflects the number of active applicants in the ES system. These three segments are linked to create a single applicant intake index.

There is another potential problem in measuring the intake count in recent years, and that is the use of group intakes. Group intake is a process whereby ES staff takes applications from two or more individuals at the same time. A 1989 study found that more than one-quarter of all offices used group intake to process the majority of their applicants.[24] The reason for using the group method is that ES staff can process about 25 percent more applicants in a given time period. But, there is a question as to whether the intake procedure is as accurate and complete in the group process. For productivity calculations, the best approach would be to separate group and individual intake data, but the data are lacking to make such a calculation so no such distinction is made here between the two approaches.

In 1987 there were about 19 million active applications in the Nation's ES offices. The average annual increase in applicant registration between 1972 and 1987 was 1.1 percent. But there are two different trends in the index. Between 1972 and 1980, it increase 4.9 percent annually, but over the 1980-87 period, it decreased 3.1 percent annually. These changes in the overall application index reflect fluctuations in the business cycle. More importantly, they reflect changes in law that require income maintenance recipients to register and look for work in order to draw benefits (table 72).

Counseling, another step in the application process, is for those who are not yet ready for a job. Counseling provides employment and occupational information to applicants, helps them interpret test results, and helps them develop employment strategies.

Counseling is included as a separate output measure to capture the additional work effort needed to process the "less job ready" applicant.[25] This type of applicant was a focus of ES service during the 1972-82 period, and considerable resources were expended on these applicants in response to policy concerns and directions.

Applicants are counseled individually or as part of a group. When group sessions are conducted, it is preferable, for productivity measurement, to count the number of sessions conducted rather than the number of individuals attending the session. This is because the time needed by ES employees to conduct a session is more closely related to the number of sessions than to the number of persons counseled.

But, in the case of the ES it is not possible to separate group from individual counseling. Data on group sessions are reported for only about half the measured years and data are lacking with which to calculate weights which are needed to combine individual and group session counseling. The data presented here are the number of times a counseling service is rendered. No distinction is made between individual counseling sessions or group sessions. The resulting index probably slightly overstates the work by the ES counselors.

Irrespective of which measure is used, counseling dropped dramatically between 1972 and 1987 (table 72). The average annual decrease, using the number of counseling interviews, was 6.4 percent. In 1972, approximately 2.5 million counseling interviews were conducted in ES offices. By 1987 the figure had dropped to less than a million. Sharp declines were reported in 1974 (21 percent), 1975 (19 percent), and

1982 (40 percent). Counseling has been hard hit by the cutback in ES funding. One study found that the number of full- or part-time State counselors declined by one third between 1981 and 1987. In 1987, six States had no staff designated as counselors.[26]

Testing, another applicant service, is often conducted in conjunction with counseling. The ES administers a number of different tests in screening applicants and helping them decide on the type of job or job training in which they are interested. The output measure for testing should be the number of tests administered or some variation of this measure. To compute a testing index, data should be collected on the number of tests given, labor weights should be developed for each test, and a weighted index computed.

For a number of years the Department of Labor collected statistics on the number and types of tests given. But no data were collected on the labor required to administer the tests. Hence, it is not possible to calculate a weighted test index for even part of the period. Furthermore, no national test data of any type were collected after 1982. The only usable data are from 1972-82 on the number of tests (transactions) administered (table 72).

Although there is some question concerning the data, there is no question concerning the drop in the number of tests administered. The average annual decrease from 1972-82 is 6.1 percent. A 1987 study found that most ES offices had dramatically cut back or eliminated testing.[27]

Referral of the individual to a job opening is the final step in the applicant process . The output measure for this step is the number of referrals, the same measure discussed earlier in this chapter as one of the basic output measures. As already noted, this measure is physical, repetitive, and reflects the work of ES employees. There are data problems, however, but probably no worse than those of the other services.

The average annual increase in the number of referrals is 0.9 percent between 1972 and 1987, but the rate is heavily influenced by the period examined. As with the other outputs, it is driven by changes in the economic situation and in government law and funding (table 72).

Service summary. To compute the service-based output index, five individual service or activity indexes are weighted and combined: Job orders, intake applications, counseling, testing, and referrals. One measure represents employer services: the number of job orders. Applicant services are measured by four outputs: Applications, counseling, testing, and referrals.

As discussed in chapter 2, indexes are combined with base year weights, which usually are revised every 5 years. But in the case of the ES, service labor data are available for only 1 year, 1980. These data show that job orders consumed 11 percent of the direct ES labor; applications used 34 percent; counseling, 7 percent; testing, 3 percent; and referrals, 45 percent. There is one additional complication in computing the service index: data on the number of tests administered are available for 1972-82 only. Hence, the testing output series is not included in the overall index for 1982-87. This required that separate indexes and labor weights be calculated for 1972-82 and 1982-87 and that the two indexes be linked in 1982 (table 72).

The results of the service output index calculations show no change over the entire 1972-87 period. This is in marked contrast to the individual services or activities, which register very different rates of change over the period table 72.

The total index reflects the individual activities weighted by their importance as measured by their labor input. Those activities with positive rates of growth, intake applications and referrals, account for about 80 percent of the labor index. Consequently, these activities shape the index.

Movements within the 1972-87 period differ depending on the activity. Counseling and testing, for example, show a fairly steady drop reflecting the cut back of these activities. Others, such as applications and referrals, rise and fall throughout the period reflecting changes in the economy and revisions to the laws and regulations governing

ES operations (table 72).

Table 72. Comparison of individual ES service outputs and total ES service output, 1972-87
(1972 = 100)

Year	Job openings	Applications	Counseling	Testing	Referrals	Weighted total
1972	100.0	100.0	100.0	100.0	100.0	100.0
1973	121.4	122.6	103.8	103.4	118.7	117.6
1974	117.0	127.0	81.8	96.3	126.5	117.8
1975	94.7	131.8	66.5	69.1	109.9	106.9
1976	110.4	131.6	63.9	66.4	116.7	111.1
1977	131.2	135.6	67.5	72.8	136.8	123.8
1978	129.7	131.9	70.3	75.8	150.8	128.6
1979	128.9	136.6	70.1	80.0	152.7	130.8
1980	110.8	147.0	73.9	79.4	146.8	129.6
1981	102.7	143.0	74.5	79.9	140.9	125.1
1982	83.7	120.2	44.4	53.3	108.6	97.9
1983	86.4	119.7	43.1		111.7	99.2
1984	89.1	119.3	41.8		114.7	100.5
1985	91.8	118.9	40.5		117.7	101.9
1986	94.5	118.5	39.2		120.8	103.2
1987	94.8	118.0	36.9		115.0	100.4
Average annual rate of change:						
1972-87	-0.4	1.1	-6.4		0.9	0.0
1974-86	-1.8	-.6	-5.9		-.4	-1.1
1974-79	2.0	1.5	-3.0	-3.6	3.8	2.1
1979-86	-4.3	-2.0	-8.0		-3.3	-3.3

Recommended output series

Three output indexes have been computed as part of this examination of the ES: Placements, referrals, and services. Placements are most often used as the measure of output. It is the primary goal of the ES. However, there are several problems with using placements as the measure of output. First, there are other ES activities, and second, placements are more heavily influenced by economic considerations than the two other measures. Placements are categorized as an outcome, not a measure of final output.

The number of referrals is another potential measure of output. It is a final output of the Employment Service and is not affected by external economic considerations to the degree that placements are. However, there are other ES outputs that are not counted in a measure of referrals.

The third measure of output is the service-based index. The service-based output index captures all major services of the ES, many of which are required by law. Job orders must be taken regardless of whether suitable job applicants are available, and applications must be taken regardless of the number of job vacancies or the job readiness of the applicant. Furthermore, ES services have changed as the ES mission has changed. Although the ES has always referred individuals to jobs, the focus in the 1960s and early 1970s was on recruiting and placing the disadvantaged. With this emphasis went job testing and client screening (other organizations conducted job training). The service-based output index captures the shifts in mission to a greater extent than do the other measures. It is for this reason that it is used as the measure of ES output.

Comparison of the indexes for the 1972-87 period shows that the average annual rate of change was 1.0 for placements, 0.9 for referrals, and 0 for services. For the peak-to-peak output period of 1974-79, the figures were 4.6, 3.8, and 2.1, respectively. But for the 1979-86 peak-to-peak periods, each index registered the same average annual decrease of 3.3 percent. It is interesting, but not surprising, that the three output

index peaks occurred in the same years for each, and the trends moved in the same direction. This comparison suggests that the years selected for comparison will have a greater affect on the rates of change than does the output measure selected (table 73).

Table 73. Comparison of three Employment Service output indexes, 1972-87
(1972=100)

Year	Placement	Referral	Service
1972	100.0	100.0	100.0
1973	118.7	118.7	117.6
1974	126.5	126.5	117.8
1975	109.9	109.9	106.9
1976	115.9	116.7	111.1
1977	138.1	136.8	123.8
1978	155.2	150.8	128.6
1979	158.1	152.7	130.8
1980	142.2	146.8	129.6
1981	133.1	140.9	125.1
1982	112.6	108.6	97.9
1983	115.7	111.7	99.2
1984	118.9	114.7	100.5
1985	122.0	117.7	101.9
1986	125.2	120.8	103.2
1987	116.4	115.0	100.4
Average annual rate of change:			
1972-87	1.0	0.9	0.0
1974-86	-.1	-.4	-1.1
1974-79	4.6	3.8	2.1
1979-86	-3.3	-3.3	-3.3

Labor inputs

Labor dominates Employment Service resource inputs. Although current statistics are lacking, a 1980 study reported that labor consumed about 85 percent of the ES budget.[28] Sizable sums have been spent on communications and computers in recent years, but the available data and anecdotal information suggests that labor remains the primary expenditure of the ES.

The same two labor measures are recommended for calculating State and local government labor productivity as noted in chapter 2: total employment and full-time-equivalent employment. The measure that is used here is the number of State ES positions. A position is equivalent to an FTE, and positions were used to budget and account for ES employees until 1982. No national data are available on the current number of ES employees.

Federal funds supported a fixed number of State employee positions prior to 1983. In 1982 the Federal Government cut back Employment Service funding, and most ES funding was shifted to a formula base which reflected each State's civilian labor force and its relative share of national unemployment. No longer were Federal funds allocated to support a specific number of State employees. The end result of these actions was to cut back the number of ES employees, and shortly thereafter the Federal Government abolished State position reporting.

Data to construct the ES employment index for 1972-82 are drawn from the Federal budget. Starting with 1984, the Federal Government no longer required the States to report the number of ES positions. Thus, the data for the index for 1982-87 had to be taken from several different sources including U.S. Congressional appropriation hearings, State reports, and from a 1987 U.S. General Accounting Office survey of the States. The GAO data are the last collected on ES positions so far as is known, and it is for this reason that the ES labor and productivity indexes stop with 1987.

From 1972-82, the Federal Government funded about 30,000 ES positions. In some years the number was slightly above this figure, in other years, particularly the mid-1970s, it dropped below this number. Overall there was little change until 1982. In 1982, ES funding cuts led to a cut of about 20 percent in the number of ES positions. The overall 1972-87 average annual change was -0.9 percent for the labor index (table 74).

Productivity trends

Employment Service output per employee year increased 1.0 percent annually between 1972 and 1987, the only years for which data are available. However, there were two distinct periods of change. Measuring peak-to-peak output periods for this sector, from 1974-79 the average annual increase in output per employee year was 2.2 percent. But from 1979-86, a period of considerable turmoil in the ES, there was an average annual decrease of 1.2 percent. These data reflect the service-based output measure (table 74).

Earlier in the discussion three different measures of output were presented: Placements, referrals, and service. Each can be used to compute productivity trends, and the results are somewhat different. For the entire 1972-87 period, the average annual increase of output per employee year for placements was 2.0 percent, for referrals it was 1.9 percent, and for service, as noted above, it was 1.0 percent.

Equally interesting is the change among the different time periods. For 1974-79, the figures were 4.6 percent, 3.9 percent and 2.2 percent, respectively. But for 1979-86, the average annual change for each of the three measures was exactly the same, -1.2 percent.

Table 74. Employment Service productivity index, 1972-87
(1972 = 100)

Year	Service-based output	Employee (FTE)	Output per employee
1972	100.0	100.0	100.0
1973	117.6	101.5	115.8
1974	117.8	99.7	118.2
1975	106.9	92.2	116.0
1976	111.1	91.3	121.7
1977	123.8	98.1	126.3
1978	128.6	99.6	129.1
1979	130.8	99.3	131.7
1980	129.6	99.3	130.5
1981	125.1	99.3	125.9
1982	97.9	79.5	123.2
1983	99.2	82.1	120.8
1984	100.5	82.1	122.4
1985	101.9	83.7	121.6
1986	103.2	85.4	120.8
1987	100.4	87.0	115.4
Average annual rate of change:			
1972-87	0	-0.9	1.0
1974-86	-1.1	-1.3	.2
1974-79	2.1	-.1	2.2
1979-86	-3.3	-2.1	-1.2

Summary and Conclusions

This chapter discussed the measurement of State government employment security services, that is, the Unemployment Insurance program and the Employment Service.

These two services are closely aligned: State government employees operate them with Federal oversight; they are usually located together; they see many of the same clients; and State employees are often shifted among the two programs in response to workload dictates. But in some respects the two services are quite different. The UI is much larger than the ES when measured by expenditures and employment and it is an income maintenance program while the ES is a job service program. There are detailed data on most aspects of the UI, but only limited information on ES operations. Finally, there have been great changes in the ES, particularly over the past decade.

In fiscal 1992, the States and the Federal Government spent slightly more than $41 billion on the two employment security operations discussed here. Most—98 percent—was spent by the UI, and most of this was in the form of transfer payments, that is, UI stipends. Administrative expenditures were about $3.5 billion for the UI and ES; the UI received about two thirds of this amount. The number of positions or FTE employees was about 66,000 in 1987, the last year for which detailed employment data are available. In 1987, the UI employed about 60 percent of the staff and the ES about 40 percent.

Unemployment Insurance. As noted earlier, the UI is a well-established and well-documented State-Federal program. Three considerations drive the change in UI output: Fluctuations in the economy, growth in the Nation's labor force, and changes in the laws that specify the benefit payment period and coverage of employees. Between 1964 and 1992, the average annual increase in UI output was 2.5 percent with very large fluctuations in output in some years. Labor input, which follows the change in output, also registered large year-to-year changes. The average annual increase in labor was 1.3 percent per year. Labor productivity increased 1.2 percent per annum during this period (table 69).

Employment Service. The ES is an even older program, but much smaller and less well known. The ES, like the UI, is shaped by fluctuations in the economy and by changes in government law and funding. ES output is effectively constrained by its resources. Between 1972-87, the only years for which ES data are available, labor input dropped 0.9 percent per year while output was essentially unchanged using the service-based measure. Labor productivity increased 1.0 percent per year, on average, throughout this period (table 74).

Employment Security Services. Data for the UI and the ES have been combined to create a single index for State employment security operations. The two services share many of the same facilities and see many of the same clients. Also, since their workload often moves in opposite directions, that is, the UI workload is contracyclical while the ES tends to be cyclical, employees in the two services are sometimes shifted to work in the service with the immediate need. Some employees are cross-trained. For productivity analysis, these reasons support the examination of the two services as a single entity.

Unfortunately, the number of years that can be measured is limited. Although the UI data cover 28 years, the ES covers only 15 years, and nothing more recent than 1987. Thus, the index is restricted to 1972-87.

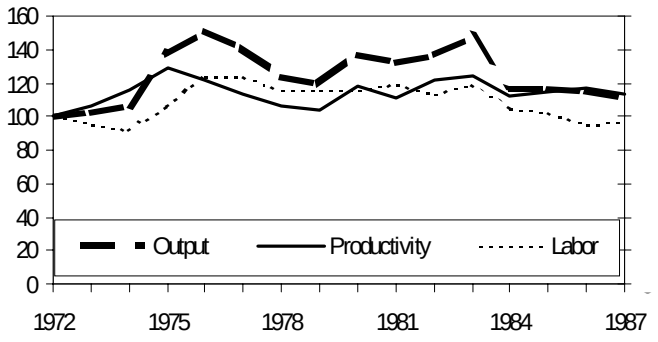
To compute the employment security index, the outputs of the two services are combined using base year labor weights to generate a new output index. The importance of each output is reflected in the overall output index by the amount of labor used to produce the output. The base years are 1972, 1977, and 1982 in keeping with the years used in the other calculations. The labor index is the index of the sum of the employment of the two services. The labor productivity index is calculated by dividing the output index by the input index.

The results of these calculations show an average annual increase in labor productivity of 0.9 percent between 1972 and 1987. Output increased 0.7 percent while labor dropped 0.2 percent per year (table 75). The most notable features of these calculations are the year-to-year fluctuations. (See chart 12.)

Table 75. State government employment security output, labor input and labor productivity indexes, 1972-87
(1972 = 100)

Year	Output	Labor input	Productivity
1972	100.0	100.0	100.0
1973	102.5	95.9	106.9
1974	106.5	92.4	115.3
1975	137.6	106.4	129.3
1976	151.4	124.7	121.5
1977	141.0	124.6	113.1
1978	123.6	116.4	106.2
1979	119.7	115.7	103.4
1980	136.8	115.7	118.3
1981	132.9	119.6	111.1
1982	137.3	113.1	121.4
1983	147.5	119.3	123.6
1984	117.2	104.9	111.8
1985	117.5	102.9	114.2
1986	115.7	96.0	117.2
1987	110.7	97.1	113.9
Average annual rate of change:			
1972-87	0.7	-0.2	0.9

Chart 12. Employment security output, labor, and labor productivity indexes, 1972-87



Endnotes

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[5] U.S. Office of Management and Budget, *Standard Industrial Classification Manual, 1987*, Washington: U.S. Government Printing Office, 1987, p. 413.

[6] For additional discussion, see the latest *Unemployment Insurance Quality Appraisal Results*, an annual publication of the U.S. Department of Labor, Employment and Training Administration.

[7] For example, see Paul L. Burgess and Jerry L. Kingston, *An Incentives Approach to Improving the Unemployment Compensation System*, Kalamazoo, Michigan: W.E. Upjohn Institute for Employment Research, 1987, pp. 133-58.

[8] All staff year counts exclude special program personnel such as those assigned to the trade adjustment program.

[9] Henry P. Guzda, "The U.S. Employment Service at 50: It Too had to Wait Its Turn," *Monthly Labor Review*, June 1983, pp. 12-19.

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[12] Congressional hearings in 1989 suggest that the ES staff had shrunk to 17,000. But these numbers may not be comparable to those listed elsewhere in this bulletin because ES staff reporting was terminated in 1984 as discussed later. However, there is no doubt that the ES staff had shrunk dramatically in the 1980s. See United States Congress House Committee on Ways and Means, Subcommittee on Human Resources, *Reforming the Unemployment Compensation System*, May 24, 1989, Washington: U.S. Government Printing Office, 1990, pp. 101, 151, and 218.

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Appendix A. Comparison of Bureau of the Census Classification of State and Local Government Functions with Standard Industrial Classification

Government function (Bureau of the Census)	Description	SIC industry	
Air transportation	Operation and support of publicly operated airport facilities.	4581	Airports, flying fields, and airport terminal services
Correction	Activities pertaining to the confinement and correction of adults and minors convicted of criminal offenses. Pardon, probation, and parole activities are also included here.	8322 8361 9223	Individual and family social services Residential care Correctional institutions
Electric power	Activities associated with the production or acquisition and distribution of electric power.	4911	Electric services
Elementary and secondary education	All activities associated with the operation of public elementary and secondary schools and locally operated vocational-technical schools. Special education programs operated by elementary and secondary school systems are also included, as are all ancillary services associated with the operation of schools, such as pupil transportation and food service.	4151 8211 9411	School buses Elementary and secondary schools Administration of educational programs
Financial administration	Includes activities concerned with tax assessment and collection, custody and distribution of funds, debt management, administration of trust funds, budgeting, and other government wide financial management activities. This function is not applied to school district or special district governments.	9311	Public finance, taxation and monetary policy
Fire protection	Applies to local government fire protection and prevention activities plus any ambulance, rescue, or other auxiliary services provided by the fire protection agency.	9224	Fire protection
Gas supply	Local government activities associated with the acquisition of gas supplies and distribution to individual consumers.	4924	Natural gas distribution
Health	Administration of public health programs, community and visiting nurse services, immunization programs, drug abuse rehabilitation programs, health and food inspection activities, operation of outpatient clinics, and environmental pollution control activities.	8082 8093 9431 9641	Home health care services Specialty outpatient facilities, nec Administration of public health programs Regulation of agricultural marketing and commodities

Appendix A. Comparison of Bureau of the Census Classification of State and Local Government Functions with Standard Industrial Classification—Continued

Government function (Bureau of the Census)	Description	SIC industry	
Higher education	Includes local government degree-granting institutions which provide academic training above grade 12.	8221	Colleges, universities and professional schools
		8222	Junior colleges and technical institutes
Highways	Activities associated with the maintenance and operation of streets, roads, sidewalks, bridges, tunnels, and toll roads, and ferries. Snow and ice removal, street lighting, and highway and traffic engineering activities are also included here.	1611	Highways and street construction
		1622	Bridge, tunnel, and elevated highway construction
		4482	Ferries
		4785	Fixed facilities and inspection and weighing services
Hospitals	Includes only government-operated medical care facilities which provide inpatient care.	8062	General medical and surgical hospitals
		8063	Psychiatric hospitals
		8069	Specialty hospitals, except psychiatric
Housing and community development	The operation of housing and redevelopment projects and other activities to promote or aid housing and community development.	6513	Operators of apartment buildings
		9531	Administration of housing programs
		9532	Administration of urban planning and community and rural development
Judicial and legal	Includes all court and court related activities (except probation and parole activities which are included at the “Correction” function), court activities of sheriff’s offices, prosecuting attorneys’ and public defender’s officers, legal departments, and attorneys providing government legal service.	9211	Courts
		9222	Legal counsel and prosecution
		9229	Public order and safety, nec
Libraries	Applies only to libraries operated by local governments for use by the general public. School and law libraries are included in “Elementary and secondary education” or “Higher education” and “Judicial and legal” categories respectively.	8231	Libraries
Natural resources	Activities primarily concerned with the conservation and development of natural resources—forest fire prevention and control, flood control, irrigation, drainage, land and forest reclamation, fish and game preservation and control, soil conservation, forestry, agricultural aids and research, agriculture development and inspection, and mineral resources.	0851	Forestry services
		0921	Fish hatcheries and preserves
		0971	Hunting and trapping, and game propagation
		4971	Irrigation systems
		9512	Land, mineral, wildlife, and forest conservation
		9631	Regulation and administration of utilities
		9641	Regulation of agricultural marketing and commodities

Appendix A. Comparison of Bureau of the Census Classification of State and Local Government Functions with Standard Industrial Classification—Continued

Government function (Bureau of the Census)	Description	SIC industry	
Other education	State government activities relating to the supervision and regulation of public and private elementary and secondary schools; programs and institutions for the training of blind, deaf, and other handicapped persons; and vocational rehabilitation programs.	8249 9411	Vocational schools, nec Administration of educational programs
Other government administration	Applies to the legislative and government-wide administrative agencies of government. Included here are overall planning and zoning activities, and central personnel and administrative activities.	9111 9121 9131 9199	Executive offices Legislative bodies Executive &legislative offices General government, nec
Parks and recreation	Government activities that include the operation and maintenance of parks, playgrounds, swimming pools, public beaches, auditoriums, public golf courses, museums, marinas, botanical gardens, and zoological parks.	0782 4493 7992 7999 8412 8422 9512	Lawn and garden services Marinas Public golf courses Amusement and recreation services, nec Museums and art galleries Arboreta and botanical or zoological gardens Land, mineral, wildlife, and forest conservation
Police protection	All activities concerned with the enforcement of law and order, including coroners' offices, police training academies, investigation bureaus, and local jails, "lockups," or other detention facilities not intended to serve as correctional facilities.	9221 9229	Police protection Public order and safety, nec
Public welfare	Included in this category are such activities as the administration of various public assistance programs for the needy, operation of homes for the elderly and indigent, and administration of programs that provide payments for medical care and other services for the needy. Health care and hospital services provided directly by a government, however, are included in the "Health" and "Hospital" functions rather than here.	8322 8351 8361 8399 9441	Individual and family social services Child day care services Residential care Social services, nec Administration of social, human resource and income maintenance programs
Sanitation other than sewerage	Refuse collection and disposal, operation of sanitary landfills, and street cleaning activities.	4212 4953 4959 9511 9631	Local trucking without storage Refuse systems Sanitary services, nec Air and water resource and solid waste management Regulation and administration of utilities
Sewerage	The provision, maintenance, and operation of sanitary and storm sewer systems and sewage disposal and treatment facilities.	4952 9511	Sewerage systems Air and water resource and solid waste management

Appendix A. Comparison of Bureau of the Census Classification of State and Local Government Functions with Standard Industrial Classification—Continued

Government function (Bureau of the Census)	Description	SIC industry	
Social insurance administration	The administration and conduct of social insurance programs. For State governments, these activities include unemployment compensation, worker compensation, and work study programs.	7361 8331 9441	Employment agencies Job training and vocational rehabilitation services Administration of social, human resource and income maintenance programs
State liquor stores	The administration and operation of liquor stores by State governments.	5182 5921 9651	Wine and distilled alcoholic beverages(wholesale) Liquor stores Regulation, licensing and investigation
Transit	Activities relating to the operation and maintenance of public mass transit systems (e.g., bus, subway, surface rail, and street railroad systems).	4111 4119 9621	Local and suburban transit Local passenger transportation, nec Regulation and administration of transportation programs
Water supply	Local government activities associated with the production or acquisition of water and distribution to the public.	4941	Water supply
Water transport and terminals	Activities which are connected with the operation and support of canals and other waterways, harbors, docks, wharves, and other related marine terminal facilities.	4491	Marine cargo handling

NOTE: nec = not elsewhere classified

SOURCE: *1992 Census of Governments-Compendium of Public Employment* (Bureau of the Census, 1997), appendix A, *and Standard Industrial Classification Manual, 1987* (Office of Management and Budget, 1987).