

Highway Income, Expenditures, and User-Tax Earnings in Standard Metropolitan Statistical Areas

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•POPULATION, motor vehicle registrations, and travel continue to grow in urban areas at such a rapid rate that increasing allocations of funds for highways are necessary to keep pace with their growth.

The high cost per mile of urban highway facilities, in view of the uniform rate of state and Federal user charges on rural and urban residents alike, prompted this inquiry into highway finances in population centers. State and local highway finance data which have recently become available are used to make comparisons relating highway income, expenditures, and highway-user earnings for selected areas. This paper provides only a limited view of the total picture, but it focuses on an area of highway finance not extensively explored in the past. No attempt was made to include or evaluate social costs attendant to the cost of urban highway systems.

To determine how highway-user earnings, highway income, and expenditures compare in urban areas, the Standard Metropolitan Statistical Area (SMSA) was adopted as the unit of measurement. This unit, established by the U. S. Bureau of the Budget for convenience of reporting, consists of the counties (or towns in New England) containing the entire urbanized portion of a metropolitan area. The SMSA includes, of necessity, the rural portion, if any, of its constituent counties. Of the 212 SMSA's defined in the 1960 census, exclusive of Puerto Rico, data were obtained on 46 for study. In Table 1, the study sample is compared with the 212 SMSA's in the United States. The sample represents nearly 22 percent of the total national population and a little more than 31 percent of the total SMSA population. As the table indicates, it is somewhat weighted in favor of the more populous areas, having 37 percent of the population of those over 1,000,000 and only 20 percent of the population of those under 250,000. Since the population groups are treated and discussed separately, the effect of this disparity is somewhat minimized.

SELECTION OF SMSA'S

All of the states were requested to report the total travel for one SMSA in 1960, subdivided where possible into travel by automobiles and travel by trucks and buses. They were also asked to give an estimated motor-fuel consumption rate for each of the two classes of motor vehicles. To obtain adequate travel data, the states were asked to report on an area in which a transportation study was recently completed or sufficiently advanced to aid in preparing the travel estimates.

The 46 SMSA's included in this analysis represent one in each of 44 states, and 2 in Indiana. New Hampshire did not provide the necessary data and there were no SMSA's in Alaska, Idaho, Vermont, and Wyoming. Although the selection on this basis does not sample the geographic or population areas to the same degree, it provides a more representative cross-section of areas in other respects. By sampling each state it was possible to report on: (a) a greater diversity of state motor-fuel and motor-vehicle tax rates; (b) a variety of construction programs, particularly of the Interstate system which in a given year may be more active in the urban areas of some states than in others; (c) a sample of areas having central cities of an origin and development in different periods of time, such as the older eastern cities and the

TABLE 1
COMPARISON OF SMSA's SELECTED FOR STUDY WITH ALL SMSA's IN UNITED STATES^a

Census Region and Population Group	No. of SMSA's and Population				Sample as Percent of Total		Square Miles of Land Area		Sample as Percent of Total	Population/Sq Mi	
	All SMSA's in United States		Study Sample				All SMSA's (sq mi)	Study Sample (sq mi)		All SMSA's	Study Sample
	No.	Population (thousands)	No.	Population (thousands)							
	No.	Population	No.	Population	No.	Population					
All SMSA's	212	112,885	46	35,246	21.7	31.2	310,233	75,855	24.5	364	465
By Census Regions:											
Northeast	47	35,347	7	6,961	14.9	19.7	35,650	6,746	18.9	991	1,032
North Central	59	30,960	13	10,443	22.0	33.7	87,834	16,678	19.0	352	626
South ^b	77	26,447	16	7,676	20.8	29.0	59,328	15,351	25.9	446	500
West	29	20,131	10	10,166	34.5	50.5	127,421	37,080	29.1	158	274
By Population Groups:											
>1,000,000	24	61,582	7	23,065	29.2	37.5	54,285	19,321	35.6	1,134	1,194
500,000 to 1,000,000	29	19,215	7	5,096	24.1	26.5	70,767	16,896	23.9	272	302
250,000 to 500,000 ^b	48	15,829	11	3,901	22.9	24.6	78,460	11,219	14.3	202	348
<250,000	111	16,259	21	3,184	18.9	19.6	106,721	28,419	26.6	152	112

^aExcludes Puerto Rico.

^bPopulation and area of Osage County of the Tulsa, Oklahoma, SMSA are not included in the sample but are included with totals of all SMSA's in the United States.

newer rapidly growing western areas; and (d) cities having urban transportation systems developed around rails and highways, and others where transportation is chiefly high-way oriented.

The geographic distribution of the SMSA's covered by this study is illustrated in Figure 1.

Some characteristics of the SMSA's selected are given in Table 2. The areas are listed in alphabetical order within each of four population groups. The population, square miles of land area, vehicle travel, and vehicles registered are given for each SMSA and for each population group to illustrate the diversity in the makeup of each area. The last four columns contain averages of persons per square mile, persons

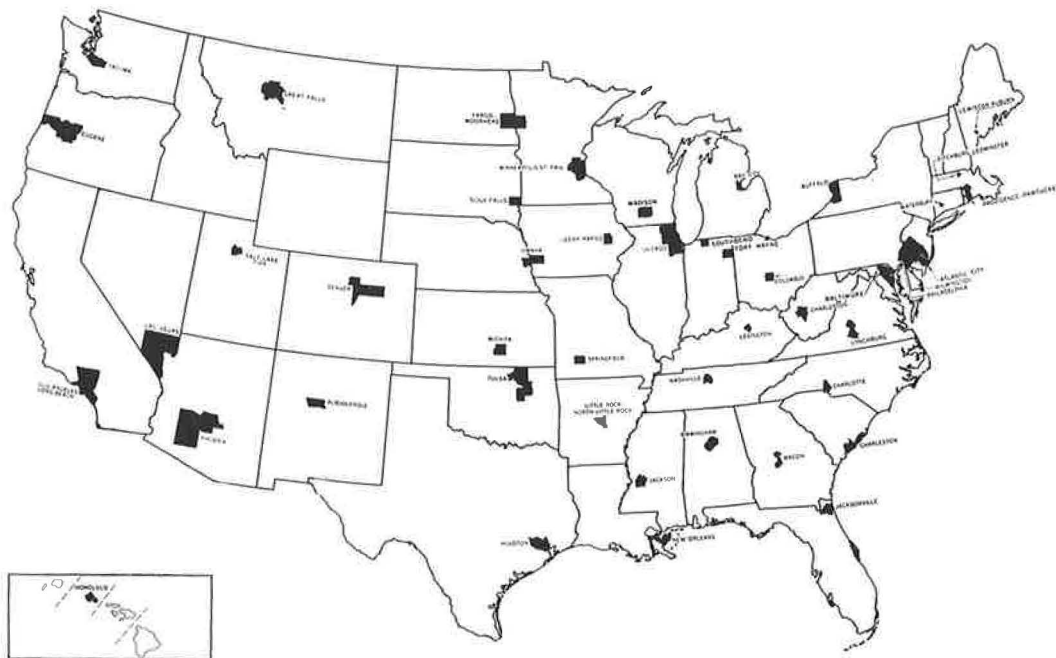


Figure 1. Geographic distribution of the 46 selected SMSA's.

per motor vehicle registered in the SMSA, average daily travel per person, and annual travel in the area per vehicle registered therein.

SOURCES AND DESCRIPTION OF DATA

The data for population, land area, and motor vehicles registered are a matter of record, except in a few cases where motor vehicle registrations were estimated. The data on vehicle-miles of travel are perhaps the most uncertain link but they appear to maintain an acceptable consistency. The extreme value of 20.0 mi of travel per person per day in the Atlantic City, N. J., area is attributable to the very heavy seasonal use by non-residents. This figure, and the corresponding figure of 20,372 mi of annual travel in the Atlantic City area per vehicle registered there, point up the fact that the denominators of these ratios are somewhat defective, in that the travel in an SMSA includes that of visitors as well as residents. On the other hand, the low value of 7.8 mi/person/day in the Philadelphia area compares reasonably with 11.3 mi in Los Angeles, and reflects a greater reliance on transit facilities and a much later development of freeways in the Philadelphia area than in Los Angeles.

TABLE 2
POPULATION, LAND AREA, VEHICLE-MILES, AND VEHICLES REGISTERED IN 46 SELECTED SMSA's, 1960

SMSA's by Population Groups	Population	Land Area (sq mi)	Vehicle-Miles of Travel (thousands)	No. of Registered Vehicles	Persons/Sq Mi	Persons/Veh	Travel/ Person/Day (mi)	Annual Travel in SMSA/Veh Registered Therein (mi)
<250,000:								
Atlantic City, N. J.	160,880	575	1,175,000	57,678	280	2.8	20.0	20,372
Bay City, Mich.	107,042	446	425,000	44,280	240	2.4	10.9	9,588
Cedar Rapids, Iowa	136,899	713	501,680	63,557	192	2.2	10.0	7,893
Charleston, S. C.	216,382	945	715,000	67,766	229	3.2	9.1	10,551
Eugene, Ore.	102,090	1,660	649,400	85,003	36	1.9	10.8	7,569
Fargo, N. D.	106,027	2,799	451,962	51,492	38	2.1	11.7	8,777
Fitchburg-Leominster, Mass.	82,486	99	426,000	28,479	833	2.9	14.1	14,958
Fort Wayne, Ind.	232,196	670	581,960	99,016	347	2.4	6.9	5,877
Great Falls, Mont.	73,419	2,659	273,057	35,904	38	2.0	10.2	7,605
Jackson, Miss.	167,045	877	589,712	70,890	213	3.6	8.6	9,319
Las Vegas, Nev.	127,016	7,927	358,823	75,750	16	1.7	7.7	4,737
Lewiston-Auburn, Me.	70,295	120	174,125	24,167	586	2.9	6.8	7,205
Lexington, Ky.	131,906	280	432,700	53,644	471	2.5	9.0	8,066
Little Rock-N. Little Rock, Ark.	243,080	767	795,700	103,603	317	2.3	9.0	7,680
Lynchburg, Va.	110,701	1,014	423,912	37,168	109	3.0	10.5	11,406
Macon, Ga.	180,403	630	451,870	66,077	286	2.7	6.9	6,839
Madison, Wis.	222,095	1,197	911,610	87,628	186	2.5	11.2	10,403
Sioux Falls, S. D.	86,575	815	340,451	40,403	106	2.1	10.8	8,426
South Bend, Ind.	236,614	467	570,090	98,138	511	2.4	6.5	5,809
Springfield, Mo.	126,276	677	659,096	56,713	187	2.2	14.3	11,622
Waterbury, Conn.	161,639	182	523,283	76,695	998	2.4	7.9	6,823
Subtotal	3,183,764	28,419	11,424,431	1,324,052	112	2.4	9.8	8,628
250,000 to 500,000:								
Albuquerque, N. M.	262,199	1,163	827,424	109,249	225	2.4	8.6	7,574
Charleston, W. Va.	252,925	908	614,431	86,156	279	2.9	8.8	9,452
Charlotte, N. C.	272,111	542	675,129	120,599	502	2.3	6.8	5,598
Jacksonville, Fla.	455,411	777	1,807,115	187,524	586	2.4	10.9	9,637
Nashville, Tenn.	399,743	532	1,208,996	147,128	751	2.7	8.3	6,217
Omaha, Neb.	457,873	1,533	1,842,338	189,698	299	2.4	11.0	9,712
Salt Lake City, Utah	383,035	764	1,155,000	174,021	501	2.2	8.3	6,637
Tacoma, Wash.	321,590	1,676	1,281,000	134,292	192	2.4	10.9	9,539
Tulsa, Okla. ^a	366,533	1,538	1,436,382	187,975	201	2.1	10.2	7,641
Wichita, Kan.	343,231	999	1,381,796	161,042	344	2.1	11.0	8,580
Wilmington, Del.	366,157	787	1,566,247	198,170	465	2.6	11.9	11,398
Subtotal	3,900,808	11,219	14,015,858	1,836,864	348	2.4	9.8	8,563
500,000 to 1,000,000:								
Birmingham, Ala.	634,864	1,118	2,052,312	234,198	568	2.7	8.9	6,703
Columbus, Ohio	682,962	337	2,636,374	282,428	1,272	2.4	10.0	9,547
Denver, Colo.	929,383	3,665	3,500,000	465,125	254	2.0	10.3	7,525
Honolulu, Hawaii	500,409	598	1,123,090	175,676	837	2.8	6.1	6,393
New Orleans, La.	809,400	1,118	1,940,493	280,907	777	3.1	6.1	6,908
Phoenix, Ariz.	663,510	9,226	3,083,304	336,465	72	2.0	12.7	2,164
Providence, R. I.	816,148	634	3,401,100	318,539	1,287	2.6	11.4	10,677
Subtotal	5,095,756	16,896	17,796,663	2,093,338	302	2.4	9.6	8,502
Over 1,000,000:								
Baltimore, Md.	1,727,023	1,807	5,965,707	572,478	956	3.0	9.5	10,421
Buffalo, N. Y.	1,305,957	1,587	3,417,680	448,307	824	2.9	7.2	7,624
Chicago, Ill.	6,220,913	3,714	19,210,133	2,063,209	1,675	3.0	8.5	9,221
Houston, Texas	1,243,158	1,711	4,265,000	572,343	727	2.2	9.5	7,452
Los Angeles, Calif.	6,742,696	4,842	27,808,000	3,415,201	1,393	2.0	11.3	8,142
Minneapolis-St. Paul, Minn.	1,462,030	2,111	5,500,000	642,617	702	2.3	10.2	8,559
Philadelphia, Pa.	4,342,897	3,549	12,313,914	1,536,952	1,224	2.8	7.8	8,012
Subtotal	23,085,674	19,321	78,480,434	9,271,107	1,194	2.5	9.3	8,465
Grand total	35,240,002	76,865	121,717,386	14,325,361	465	2.5	9.5	8,497

^aDoes not include the population and area of Osage County of the Tulsa, Oklahoma SMSA.

Travel

The states were requested to report the total motor-vehicle travel on all roads and streets of the selected SMSA for 1960. It was further asked that the travel be classified into: (a) that on rural roads and that on urban highways and streets of the SMSA, and (b) that of automobiles, and that of trucks and buses combined. The response by the states produced varying degrees of detail ranging from travel classified by vehicle types and by road systems to travel reported only in terms of total vehicle-miles, with percentages indicating distribution of the total travel between automobiles, trucks and buses.

The method of estimating and classifying the travel in the SMSA's varied for the different areas. For those in which some form of area transportation studies were available, the data were fitted to 1960 by travel trends; in others, estimates were prepared from available information on mileage of local streets and arterials and the corresponding current travel volumes on them. Generally, too, where data from area transportation studies were utilized, it was necessary to supplement them with travel in the area beyond that study's external cordon to the county boundaries forming the SMSA. Since these outlying areas are predominantly rural, however, it is believed that sufficient accuracy was obtained because the routes carrying the bulk of the travel are the state highways and primary local roads for which data were available from current traffic-counting programs.

Motor-Vehicle Registrations

Registrations of motor vehicles by counties, compiled by the states, are currently available for approximately 41 states. For the SMSA's in the remaining states, registrations were estimated by use of collateral data of the U. S. Bureau of Census (1), and the annual and special reports of state motor vehicle registrations (2).

Road and Street Income

The income for road and street purposes of the SMSA's comes from various revenue sources. The accounting of the income for each SMSA is obtained by the state highway departments from state and local records and summarized in reports transmitted annually to the U. S. Bureau of Public Roads.

Income and expenditure data of local governments in this analysis are summarized from forms PR-532 and PR-535, Local Road and Street Finance Report. The PR-535 report includes for each SMSA the annual receipts, disbursements, obligations issued, application of proceeds, and a statement of interest and bond redemptions. State road-user income equivalent to state highway expenditures given in form PR-532-B is assigned from state and Federal user revenues as explained later.

In this study, highway income is classified according to: (a) the imposts on highway users collected at Federal, state and local levels and tolls on state and local facilities; and (b) other SMSA revenue income, consisting of property taxes and assessments, general fund appropriations (state and local), and miscellaneous local income derived from a variety of sources including subdivider's payments for road improvements, fines for parking meter violations, rentals, excavation permits, utility taxes, adjustments and repairs, and such sources as traffic fines and other fees not specifically identified.

Investment income and borrowing, indicated under a separate heading in Table 3, includes interest on deposits and earnings on short-term investments as well as proceeds from bonds and notes issued.

The income in Table 3 represents all of the funds reported available for roads and streets in each SMSA.

Road and Street Expenditures

The expenditures on roads and streets for each SMSA are complete insofar as was possible from the available data.

TABLE 3
ROAD AND STREET INCOME OF 46 SELECTED SMSA's, 1960
(\$ × 1,000)

SMSA's by Population Group	From Imposts on Road Users						Other Revenue Income					Total Revenue Income	Investment Income and Borrowing	Total Income
	Federal Aid	State	Local (includes parking fees)	Tolls, State Facilities	Tolls, Local Facilities	Total	Property Taxes and Assess- ments	General Fund Appro- priations	Miscel- laneous	Total				
<250,000:														
Atlantic City, N. J.	550	1,835	273	380	—	3,038	1	3,593	—	3,594	6,632	221	—	6,853
Day City, Mich.	1,624	3,524	—	—	—	5,158	48	440	219	716	5,874	555	—	6,429
Cedar Rapids, Iowa	702	2,131	210	—	—	3,043	2,214	22	122	2,358	5,401	561	—	5,962
Charleston, S. C.	1,815	2,267	—	—	—	4,082	—	485	—	485	4,567	—	—	4,567
Eugene, Ore.	6,727	5,780	276	—	—	12,783	1,292	—	39	1,331	14,114	696	—	14,810
Fargo, N. D.	8,298	4,523	—	—	—	12,821	1,983	573	133	2,689	15,510	2,186	—	17,696
Fitchburg-Leominster, Mass.	53	253	1,012	—	—	1,318	—	269	198	467	1,785	—	—	1,792
Fort Wayne, Ind.	1,259	3,397	95	—	—	4,691	1,079	171	68	1,318	6,009	—	—	6,009
Great Falls, Mont.	2,402	1,465	137	—	—	3,054	1,687	—	—	1,637	6,381	181	—	5,462
Jackson, Miss.	1,858	2,048	137	—	—	4,043	2,761	848	301	3,910	7,953	2,313	—	10,266
Las Vegas, Nev.	2,355	2,012	197	—	—	4,564	635	424	139	1,198	5,762	460	—	6,222
Lewiston-Auburn, Me.	58	53	134	272	—	517	—	717	15	732	2,249	20	—	2,269
Lexington, Ky.	800	726	81	—	—	1,607	—	326	—	826	2,513	188	—	2,701
Little Rock-N. Little Rock, Ark.	12,349	6,802	186	—	—	19,339	1,084	943	157	2,184	21,523	—	—	21,523
Lynchburg, Va.	974	1,228	4	—	—	2,462	2	412	2	418	2,880	788	—	3,668
Macon, Ga.	1,050	774	174	—	—	1,998	502	493	10	1,005	3,003	—	—	3,003
Madison, Wis.	3,219	6,780	360	—	—	10,359	2,196	2,463	206	4,665	15,224	1,486	—	16,710
Sioux Falls, S. D.	4,724	3,492	158	—	—	8,374	641	494	144	1,279	9,653	600	—	10,253
South Bend, Ind.	99	2,667	152	—	—	2,918	1,039	—	516	1,555	4,473	1,000	—	5,473
Springfield, Mo.	1,408	2,569	770	—	—	4,747	860	155	285	1,280	6,027	265	—	6,292
Waterbury, Conn.	1,050	3,296	26	—	—	4,372	4	1,960	287	2,251	6,623	25	—	6,648
Subtotal	53,114	57,562	4,640	652	—	115,968	17,970	15,297	2,821	36,088	152,056	11,552	—	163,608
250,000 to 500,000:														
Albuquerque, N. M.	6,589	4,472	629	—	—	11,690	2,692	52	276	3,020	14,710	2,809	—	17,519
Charleston, W. Va.	422	2,220	257	—	—	2,899	363	1,023	—	1,386	4,285	—	—	4,285
Charlotte, N. C.	970	2,706	144	—	—	3,820	—	1,857	—	1,857	5,677	—	—	5,677
Jacksonville, Fla.	10,438	10,001	427	3,338	—	24,204	2,234	1,634	1,997	5,865	30,069	1,673	—	31,742
Nashville, Tenn.	11,288	6,962	1,401	—	—	19,651	1,813	85	198	2,096	21,747	654	—	22,401
Omaha, Neb.	6,591	9,489	1,987	—	197	18,264	5,003	—	344	5,347	23,611	2,760	—	26,371
Salt Lake City, Utah	5,798	3,707	257	—	—	9,762	2,391	943	171	3,505	13,267	—	—	13,267
Tacoma, Wash.	2,341	6,495	—	—	—	9,836	1,451	1,157	259	2,667	12,703	—	—	12,703
Tulsa, Okla.	1,996	4,360	484	1,598	—	8,438	850	744	426	2,020	10,478	4,481	—	14,959
Wichita, Kan.	4,149	3,478	418	359	—	8,404	7,842	362	840	9,044	17,448	6,659	—	24,107
Wilmington, Del.	3,762	1,597	467	4,770	—	10,596	99	4,412	28	4,539	15,135	5,853	—	20,988
Subtotal	55,344	55,507	6,471	10,065	197	127,584	24,738	12,269	4,539	41,546	169,130	24,869	—	194,019
500,000 to 1,000,000:														
Birmingham, Ala.	3,088	4,020	2,203	—	—	9,301	4,502	—	969	5,561	14,952	3,300	—	18,252
Columbus, Ohio	7,076	16,711	446	—	—	25,033	2,337	696	961	3,994	29,027	8,203	—	37,230
Denver, Colo.	6,677	10,453	—	643	—	17,773	4,441	2,580	752	7,773	25,546	47	—	25,593
Honolulu, Hawaii	3,806	8,284	4,369	—	—	16,459	3,493	85	474	4,052	20,510	—	—	20,510
New Orleans, La.	8,314	8,997	539	2,926	1,437	22,213	5,259	5,476	1,796	12,531	34,744	9,074	—	43,818
Phoenix, Ariz.	7,651	6,850	—	—	—	14,501	1,635	5,144	4,349	11,128	25,629	4,686	—	30,315
Providence, R. I.	13,686	13,454	1,390	718	—	29,248	12	10,104	222	10,336	39,586	4,368	—	43,954
Subtotal	51,098	86,769	9,026	4,287	1,437	134,617	21,769	24,085	8,523	55,377	189,994	29,678	—	219,672
Over 1,000,000:														
Baltimore, Md.	7,629	32,683	4,602	5,558	351	51,023	865	13,016	442	14,323	65,346	4,840	—	70,186
Buffalo, N. Y.	8,804	13,159	781	4,637	—	27,381	5,069	18,223	1,277	24,569	51,930	12,774	—	64,704
Chicago, Ill.	88,098	104,295	39,000	10,426	2,308	253,007	30,443	5,978	7,741	38,112	292,119	83,073	—	375,192
Houston, Tex.	15,146	21,653	687	—	—	37,486	20,674	6,387	3,766	30,827	68,313	19,224	—	87,537
Los Angeles, Calif.	32,529	121,238	3,666	—	281	157,734	11,202	44,776	15,262	71,240	228,974	10,720	—	239,694
Minneapolis-St. Paul, Minn.	26,225	27,770	1,072	—	—	55,067	19,945	6,832	3,175	29,952	85,019	11,495	—	96,514
Philadelphia, Pa.	12,406	40,074	1,989	26,034	1,566	84,079	429	26,987	7,215	34,631	118,710	14,601	—	133,311
Subtotal	191,637	361,152	51,907	56,655	4,406	665,757	88,627	122,149	32,878	244,654	910,411	156,727	—	1,067,138
Total, all SMSA's	351,193	542,990	72,044	71,659	6,040	1,043,926	153,104	173,800	50,761	377,665	1,421,591	222,846	—	1,644,437

The roads and streets of these areas are under several jurisdictions, state, county, and municipal (city). Road and street construction and maintenance are accomplished by one, two, or jointly by all three, levels of government. To the extent that capital outlays are identified by system, they are listed in this report by state and local systems, rural and municipal. Expenditures for maintenance, operation, and administration, being less easily identified, are combined. In the latter classification, local expenditures are complete but state outlays are not, as explained later.

Expenditures of state funds may be through capital outlay, including Federal aid, or state maintenance on state highway extensions in municipalities, on local rural roads or municipal streets, or by grants-in-aid payments to local rural or municipal units which are reflected in construction, maintenance and administration expenditures at the local level. Fund transfers also take place between local rural and municipal units, as well as by direct construction in each other's jurisdiction.

Local rural (county), and municipal (city) highway administration, traffic police, bond service, and other miscellaneous expenditures are believed to be adequately represented in the reported data from the local records.

Data for state and local toll facilities are available from the annual reports to the U. S. Bureau of Public Roads. The income and expenditures for each of the facilities situated entirely within a SMSA were used as recorded in the annual reports. However, the expenditures for facilities beyond the boundary of a SMSA, principally toll roads, for all purposes (construction, maintenance, administration, etc.) were assigned in the proportion that the earnings within the SMSA reported for this analysis were to the earnings of the entire facility.

Highway-User Earnings

User taxes consist of a variety of levies: on the owner or operator of a vehicle, on the vehicle itself, or on vehicle use. Registration fees, vehicle excise and use taxes, transfer and title charges, certain truck and bus franchise or use permits, and driver licenses are paid periodically and are a condition for owning and operating a vehicle on the highways. Gasoline and special fuel taxes, truck and bus mileage taxes, and taxes on tires and tubes are paid intermittently depending on the number of miles a motor vehicle is operated.

At the Federal level, in 1960 excises of the Federal trust fund on gasoline and special fuels at \$0.04/gal; tires at \$0.08/lb; innertubes at \$0.09/lb; tread rubber at \$0.03/lb; truck, bus, and trailer excise at 5 percent of manufacturers' wholesale price; and the vehicle use tax at \$1.50/1,000 lb, are designated for highway purposes and constitute the group of user taxes for which earnings were evaluated. Other Federal automotive excise taxes, such as the automobile vehicle excise tax, taxes on accessories and lubricating oil, and the remaining truck, bus, and trailer excise at 5 percent of the manufacturers' wholesale price, accrue to the general fund and are not included with the earnings of this analysis.

State user charges consist of gasoline and special fuel taxes, mileage, ton-mile, and franchise taxes, registration fees, operator and chauffeur licenses, and miscellaneous charges for titling or transfer of vehicles.

Local road-user charges are not levied in all states or in all local jurisdictions of a state. These charges, where imposed, may consist of motor fuel, bus and wheel taxes, and licenses for automobiles and trucks. Although traffic fines and allied fees are often not considered to be regularly imposed user levies, when identified and used for highway purposes they are included with user taxes.

Earnings based on use were computed for all travel in a SMSA regardless of where the vehicles were domiciled. The periodic payments, such as registration and other charges, are only those paid by the vehicles domiciled in the SMSA.

METHODS USED TO DEVELOP ROAD-USER EARNINGS

Evaluation of Earnings

Federal, state, and local fuel taxes, where levied, are earned with each mile of travel. Federal excises on tires, tubes and tread rubber are earned in direct proportion to the amount of travel and are paid at the time these items are purchased or replenished. Other tax earnings, such as state and local registration fees, operator and chauffeur licenses, titling taxes, transfer, certain mileage, permit, and other fees, are in the form of annual or periodic charges.

Imposts on highway users at the local level include parking and other miscellaneous fees such as traffic fines and penalties. The latter are not usually considered in a user tax category but because they are attributable to motor vehicles or paid as a consequence of their use, they have been included with user earnings in the amounts reported received by the localities making up the SMSA's of this analysis.

Federal and State Motor Fuel Tax Earnings.—It is estimated that automobiles consume an average of a gallon of gasoline for every 14.3 mi of travel (0.070 gal/mi), representative of all travel (3). To obtain a consumption rate applicable to automobiles operating in SMSA's with the greater incidence of stop-and-go driving and lower average speeds, compared with rural operation at higher average speeds and with less interruption from traffic signals and traffic friction, it was necessary to examine consumption rates obtained from operation under these different conditions.

For instance, in a study examining the financing of road systems in the Philadelphia area (4), a motor fuel consumption rate 50 percent greater for all vehicles, automobiles and commercial vehicles was considered for operation in urban vs rural areas. Recent studies giving some indication of consumption rates for rural, urban, and overall operation support evidence that fewer miles per gallon (more gallons per mile) are obtained in urban operation than in average or rural operation.

TABLE 4

INDEX OF AUTOMOBILE-MOTOR FUEL CONSUMPTION RATES
UNDER CONDITIONS OF OVERALL OPERATION COMPARED
WITH OPERATION PREDOMINANTLY IN RURAL AND IN
URBAN AREAS

Source	Consumption Rates (gal/mi)			Index of Consumption Rates		
	Avg.	Rural	Urban	Avg.	Rural	Urban
Illinois MVU ^a	0.0725	0.0671	0.0813	1.00	0.93	1.12
Lieder ^b	0.0690	0.0625	0.0785	1.00	0.91	1.14
7-State MVU ^c	0.0669	0.0616	0.0724	1.00	0.92	1.08
This study	0.0700 ^d	0.0650	0.0756	1.00	0.93	1.08

^aData derived from Ref. 11.

^bData derived from Ref. 12.

^cData derived from Ref. 13.

^dData derived from Ref. 3; rate for urban consumption developed for this analysis.

urban conditions are for vehicles operated 90 percent or more of the reported mileage at speeds under 35 mph.

The fourth set of rates was obtained in a somewhat different manner. The 0.070 gal/mi (14.3 mi/gal) rate was developed for the Highway Cost Allocation Study (3) as a national average consumption rate applicable to all automobiles. The rural-urban differential applied to this rate was obtained by application of estimated values reflecting operation characteristics of entire SMSA's, some of which contain considerable rural areas.

For this purpose, it was necessary to assume an average operating speed in an urban area, the number of stops per mile, the duration of stops, and the average rural road speeds.

After consultation with persons concerned with traffic analysis, and by reference to other data (5, 6), a decision was made to use 1½ stops per mile as representative of travel in a SMSA.

Using measurements developed by Claffey (7) for fuel consumption at different speeds, consumption of fuel while coming to a stop and accelerating again to average speed, and consumption while idling at a stop, an urban rate 1.08 times the average consumption rate was obtained. This differential was applied to the 0.070 gal/mi national average rate, resulting in an urban automobile consumption rate of 0.076 gal/mi (13.2 mi/gal).

Table 4 lists the automobile motor fuel consumption rates obtained from three studies, as well as the rate adopted for use in this analysis. The consumption rates for rural and urban operation of the first three studies were obtained from respondents to questionnaires. Urban operation in these studies is defined as the mileage operated at speeds below 35 mph which would be indicative of operation in urban areas. The rates given for operation under rural conditions in Table 4 are those obtained by vehicles reported to have been operated 90 percent or more of their travel at speeds above 35 mph, and the rates for

TABLE 5
MOTOR FUEL CONSUMPTION RATES FOR APPLICATION TO SMSA TRAVEL TO DERIVE MOTOR
FUEL TAX EARNINGS BY MOTOR VEHICLES

Vehicle Type	Avg. U. S. Motor Fuel Consump. Rate: Gasoline and Diesel Veh ^a		Consump. Rate Differential for Urban Areas When Avg. U. S. Rate is 1.0 ^b	Avg. Motor Fuel Consump. Rate for Urban Areas	
	Gal/Mi	Mi/Gal		Gal/Mi	Mi/Gal
Automobile	0.070	14.29	1.08	0.076	13.16
Transit bus	0.237	4.22	1.05	0.249	4.01
Intercity bus	0.167	5.99	1.23	0.215	4.65
School and other bus	0.129	7.75	1.00	0.129	7.75
2-axle, 4-tire truck	0.555	12.50	1.00	0.080	12.50
2-axle, 6-tire truck	0.123	8.13	1.20	0.148	6.76
3-axle truck	0.180	5.56	1.40	0.263	3.97
2-S1, 3-axle tractor-semitrailer combination	0.191	5.24	1.40	0.267	3.75
2-S2, 4-axle tractor-semitrailer combination	0.217	4.61	1.40	0.304	3.29
3-S2, 5-axle tractor-semitrailer combination	0.219	4.57	1.40	0.307	3.26
2-1, 3-axle truck-full trailer combination	0.159	6.29	1.40	0.223	4.48
2-2, 3-1, 4-axle truck-full trailer combination	0.204	4.90	1.40	0.286	3.50
2-3, 3-2, 5-axle truck-full trailer combination	0.218	4.59	1.40	0.305	3.28
3-3, 6-axle truck-full trailer combination	0.229	4.37	1.40	0.321	3.12
3-unit, tractor-semitrailer-full trailer combination	0.233	4.29	1.40	0.326	3.07
All trucks, buses, and combinations ^c	0.129	7.77	1.23	0.159	6.29
All vehicles ^c	0.081	12.35	1.14	0.092	10.87

^aWeighted average consumption rates developed from those used in the Supplementary Report of the Highway Cost Allocation Study (3). Weighted averages reflect relative numbers of gasoline and diesel vehicles in each vehicle type group.

^bThis differential considers total travel in rural and urban areas by each vehicle type as developed for Highway Cost Allocation Study (3), at consumption rates indicated for rural and urban operation from various studies.

^cWeighted by total travel and fuel consumption of all vehicle types indicated.

TABLE 6
ESTIMATED MOTOR FUEL TAX EARNINGS PER MILE OF TRAVEL IN SMSA's BY VEHICLE GROUPS AT VARIOUS TAX RATES

Tax Rate/ Gal (\$)	Automobiles (\$)	Trucks, Buses and Combinations (\$)
0.03	0.023	0.048
0.04	0.030	0.064
0.05	0.038	0.080
0.06	0.045	0.095
0.07	0.053	0.111

and a composite urban rate for the various types of commercial vehicles. Since vehicle travel data in most cases were obtainable only in the broad categories, i.e., automobiles and all other vehicles, only the automobile and the composite truck and bus consumption rates were used.

The gallonage obtained by applying the gallons-per-mile rates to the travel reported for the respective groups of motor vehicles in each SMSA was evaluated at \$0.04/gal to obtain the amount of Federal excise tax earned on motor fuel use, and by the appropriate 1960 state motor fuel tax rate (and local fuel tax rate where applicable) to obtain the state and local motor fuel tax earnings.

Table 6 gives the tax contribution per mile of travel at the various rates at which motor fuel is taxed. Only one state, Missouri, had a \$0.03 motor fuel tax rate in 1960; none taxed fuel at \$0.04 which is the Federal excise tax rate. The weighted average state gasoline tax rate nationally in that year was \$0.0592/gal, compared with a weighted average rate of \$0.0575 for the gallonage tax of the SMSA's in the study.

The truck, bus, and combination urban motor fuel consumption rate differential was determined in somewhat the same manner, employing the consumption rates per stop and idling time of Kent (8) and Sawhill and Firey (9), for the range of vehicle sizes and weights given. A 25-mph average speed in urban areas was assumed; 1½ stops per mile and a 15-sec average idling time were estimated, the latter two being the same as those assumed for automobiles. Average rural speeds for trucks were assumed to be 40 mph, and for buses 50 mph, compared with 45 mph for automobiles.

The results obtained for each vehicle type group are given in Table 5 which indicates the average U. S. consumption rates, the differential, the urban rate,

Other Federal Trust Fund Taxes.—The 1960 Federal trust fund taxes paid by highway users (2, pp. 83-84) are accounted for in Table 7.

An additional \$5.1 million of truck, bus, and trailer excise, use tax, and rubber taxes paid by the vehicles of the Federal government are not included in the amounts given in Table 7 but were added in the computation to obtain the rates per vehicle-mile of travel.

No differential for rural and urban rates of consumption was assumed for the use taxes other than motor fuel taxes, and a uniform rate per mile of travel was assigned.

The division of vehicle excise, use, and tire, tube, and rubber taxes between those paid for automobile use and commercial vehicle use was accomplished according to the detailed analysis prepared for the Highway Cost Allocation Study (3). The income of the Federal trust fund in 1960 from taxes other than motor fuel,

TABLE 7
FEDERAL TRUST FUND TAXES PAID BY HIGHWAY USERS, 1960

Vehicle	\$ (Million)
Motor fuel	2,269
Other:	
Truck, bus, and trailer excise	127
Motor-vehicle use tax	45
Tires, tubes, and tread rubber	273
Total	2,714

TABLE 8
HIGHWAY TRUST FUND RECEIPTS FROM TIRE, TUBE, TREAD
RUBBER, TRUCK AND BUS VEHICLE EXCISE, AND VEHICLE
USE TAXES, 1960

Vehicle Class for Which Paid	Total Amount (million \$)	Total 1960 U. S. Travel (billion veh-mi)	Estimated Tax Earning per Mile of Travel (\$)
Automobiles	154	588.1	0.00026
Trucks, buses, and combinations	296	130.7	0.00227
Total	450	718.8	0.00

TABLE 9
TEXAS MOTOR VEHICLE REGISTRATION AND OTHER FEES BY
AUTOMOBILES AND BY TRUCKS AND BUSES, 1960

Fee	Total (\$ × 1,000)	Automobiles (\$ × 1,000)	Trucks and Buses (\$ × 1,000)
State ^a :			
Auto registration fees	54,576	54,576	—
Bus registration fees	474	—	474
Truck and tractor truck registration fees	36,884	—	36,884
Trailer registration fees	11,516	—	11,516
Motorcycle registration fees	220	220	—
Automobile operator and learners licenses	3,630	3,630	—
Taxi chauffeur licenses	12	12	—
Bus and truck chauffeur licenses	2,964	—	2,964
Other fees:			
Classified ^b	1,683	—	1,683
Unclassified ^c	33,248	26,366	6,882
Total	145,407	85,004	60,403
SMSA registration and other fees ^d	17,269	11,730	5,539

^aAverage fee for registrations is \$24.05 for automobiles, \$65.47 for trucks and buses. Based on a total of 3,534,351 automobile registrations, and 922,671 truck and bus registrations, totaling 4,457,022.

^bOverweight and overweight fees, carrier taxes, certificate or permit, and carrier fines and penalties, all of which are attributable to buses and trucks.

^cTitle and titling taxes, transfer, inspection, and other fees paid by automobiles and commercial vehicles, but no identification by whom paid was available. Division between automobiles and trucks and buses made by prorating on the basis of the numbers of vehicles registered in the two categories.

^dBased on a total of 487,740 automobile registrations, and 84,603 truck and bus registrations, totaling 572,343.

including payments by vehicles of Federal agencies, amounted to \$450 million and is divided among automobiles and commercial vehicles as indicated in Table 8.

State Registration Fees and Other State Taxes.—The numbers and types of registered vehicles in the counties of a SMSA are available in varying detail from the registration reports prepared by about 41 states. In addition to the number of vehicles by counties, the reports of several states include payments of registration and other fees on those vehicles, in which case these payments were used as the total of such contribution by road users in the county or counties of the SMSA.

In the states where such payments were not classified by counties, statewide per-vehicle averages for automobiles and for trucks and buses combined were multiplied by the corresponding numbers registered in the SMSA. An example of the division of a state's fees between automobiles and commercial vehicles is indicated for one state in Table 9. As in the example given, each state's fees (or those of a county when data were available) identified by the vehicles for which paid were allocated to automobiles or to trucks and buses. The remaining fees were summarized, and an average per vehicle payment was obtained and allocated to each vehicle group according to numbers of vehicles registered.

For the SMSA's extending beyond state

boundaries, separate computations were made for the counties of each state to reflect the state's fee schedules.

The state motor vehicle registration and other fees obtained by these methods produced an earning of \$376 million in the 46 SMSA's of the study.

Tolls and Local Taxes and Fees.—Nearly all of the local toll facilities, principally bridges, are located entirely within the study SMSA's. The data from the financial statements of such toll facilities in reports to the U. S. Bureau of Public Roads provided the information for this analysis.

For state-administered toll road facilities extending beyond the boundaries of a SMSA, the total travel and the tolls earned on the travel within the SMSA were reported by the state highway departments.

Local imposts on road users (as well as other highway income and expenditures) for each SMSA were available from the annual reports to the U. S. Bureau of Public Roads (2, pp. 127-140). Motor-vehicle user tax earnings at the local (county or city) level consist of motor fuel taxes, motor vehicle registration and other fees where levied, and parking fees.

COMPARISON OF INCOME, EXPENDITURES AND EARNINGS

Road and Street Income

Table 3 gives the income of each SMSA, by source, Federal, state and local, classified between imposts on road users, other revenue income, and receipts from borrowing. Figure 2 shows by proportions the total income by source. State road-user income, equal to state highway expenditures within each SMSA, is assigned as reported

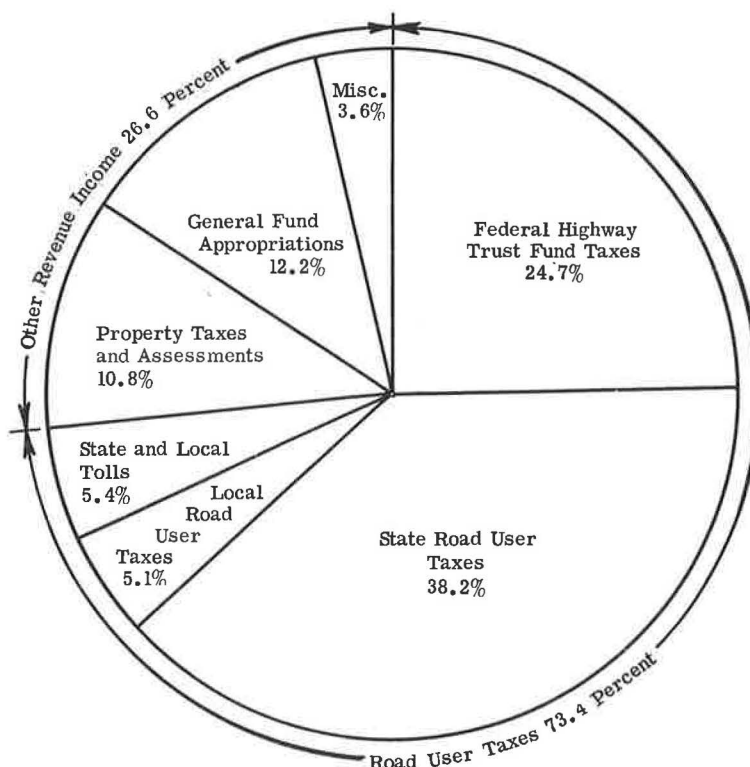


Figure 2. Sources of revenue income for highway purposes in 46 selected SMSA's in 1960.

in annual reports by the states. Since Federal aid is available exclusively for capital improvements, Federal funds were assigned to each SMSA as a pro-rata share of the state's capital outlay in the ratio that Federal-aid reimbursements were to total capital outlay by the state.

Local income, by source, is as reported annually in the road and street finance reports for the SMSA's. Toll facility income, both state and local, is that reported as toll facility earnings in Table 10.

The total revenue income of the 46 SMSA's amounted to \$1,422 million of which \$1,044 million or 73.4 percent came from imposts on road users and \$378 million or 26.6 percent from property taxes and assessments, general fund appropriations, and miscellaneous income. The income of \$1,044 million from imposts on road users compares with road-user earnings in these SMSA's of \$1,650 million (Table 10), a sharing of 63 percent.

Property taxes and assessments, general fund appropriations, and miscellaneous income of the SMSA's provided 26.6 percent of the road and street income while, nationally, receipts from these sources (10) account for 18 percent of the total receipts for highways, including small amounts of Federal and state general fund appropriations.

Investment income and borrowing of \$223 million supplemented the revenue income for highways of the SMSA's. (These items are not relevant to the comparisons made in this paper; borrowings are balanced over time by debt retirements, and are not to be considered as revenue income. Investment income, a very small item, does contribute to the funds available for expenditure, but it is not relevant to comparisons of user and nonuser income.)

The imposts on road users, including tolls, accounted for 71 to 76 percent of the revenue income among the four SMSA groups by population size. The population group 500,000 to 1,000,000 has the lowest percentage of its total income from road-user

TABLE 10
ESTIMATED MOTOR-VEHICLE USER-TAX AND TOLL EARNINGS GENERATED BY TRAVEL AND VEHICLE OWNERSHIP IN 48 SELECTED SMSA's IN 1960,
AT 1960 TAX RATES AND TOLLS

SMSA by Population Group	Vehicle-Miles of Travel Within SMSA (millions)	Collecting Agencies						Total User Taxes on Highway Use in SMSA (\$ × 1,000)	Ratio of User Earnings to Expenditures	
		Federal Government	State Agencies ^a			Local Governments ^a				
		Excise Taxes of the Federal- Highway Trust Fund ^b (\$ × 1,000)	Motor Fuel and Vehicle Taxes and Fees (\$ × 1,000)	Tolls (\$ × 1,000)	Total State Taxes and Fees (\$ × 1,000)	Motor Fuel and Vehicle Taxes and Fees ^c (\$ × 1,000)	Tolls (\$ × 1,000)	Total Local Taxes and Fees (\$ × 1,000)		
<250,000:										
Atlantic City, N. J.	1,175	4,690	7,102	380	7,482	273	—	273	12,445	1.93
Bay City, Mich.	425	1,751	3,354	—	3,354	—	—	—	5,105	0.81
Cedar Rapids, Iowa	502	2,125	4,988	—	4,988	310	—	210	7,323	1.29
Charleston, S. C.	715	3,103	5,332	—	5,332	—	—	—	8,435	1.80
Eugene, Ore.	643	2,597	6,456	—	6,456	276	—	276	9,329	0.67
Fargo, N. D.	153	1,063	2,036	—	2,036	—	—	—	5,797	0.34
Fitchburg-Leominster, Mass.	426	1,492	2,286	—	2,286	1,012	—	1,012	4,790	2.90
Fort Wayne, Ind.	582	2,399	5,072	—	5,072	95	—	95	7,566	1.37
Great Falls, Mont.	273	1,048	2,174	—	2,174	137	—	137	3,359	0.69
Jackson, Miss.	590	2,526	5,112	—	5,112	137	—	137	7,775	1.08
Las Vegas, Nev.	359	1,722	3,658	—	3,658	197	—	197	5,577	0.94
Lewiston-Auburn, Me.	174	622	1,650	272	1,922	134	—	134	2,678	2.20
Lexington, Ky.	433	1,832	3,666	—	3,666	81	—	81	5,579	2.06
Little Rock-N. Little Rock, Ark.	796	3,876	7,330	—	7,330	188	—	188	11,394	0.51
Lynchburg, Va.	424	1,837	3,220	—	3,220	260	—	260	5,317	1.58
Macon, Ga.	452	1,721	3,273	—	3,273	174	—	174	5,168	1.74
Madison, Wis.	911	3,916	7,436	—	7,436	360	—	360	11,712	0.75
Sioux Falls, S. D.	340	1,435	3,027	—	3,027	156	—	156	4,620	0.46
South Bend, Ind.	570	2,301	4,888	—	4,888	152	—	152	7,341	1.88
Springfield, Mo.	659	2,505	2,962	—	2,962	770	—	770	6,237	1.11
Waterbury, Conn.	523	2,146	4,208	—	4,208	26	—	26	6,380	0.94
Subtotal	11,424	47,666	91,029	652	91,681	4,640	—	4,640	143,927	0.94
250,000 to 500,000:										
Albuquerque, N. M.	828	3,531	7,109	—	7,109	629	—	629	11,269	0.67
Charleston, W. Va.	815	3,504	8,734	—	8,734	237	—	237	12,495	2.95
Charlotte, N. C.	675	2,741	6,462	—	6,462	144	—	144	9,347	1.67
Jacksonville, Fla.	1,807	7,297	15,715	3,338	19,053	427	—	427	26,777	0.70
Nashville, Tenn.	1,209	5,147	10,389	—	10,389	1,401	—	1,401	16,937	0.78
Omaha, Neb.	1,842	7,585	14,988	—	14,988	1,987	197	2,184	24,757	1.00
Salt Lake City, Utah	1,155	4,929	8,908	—	8,908	257	—	257	14,094	1.08
Tacoma, Wash.	1,281	5,097	12,035	—	12,035	—	—	—	17,122	1.28
Tulsa, Okla. ^d	1,436	5,931	15,757	1,598	17,355	484	—	484	23,770	1.67
Wichita, Kan.	1,382	5,514	8,846	359	9,205	418	—	418	15,137	0.85
Wilmington, Del.	1,586	6,554	11,000	4,770	15,770	467	—	467	22,791	1.36
Subtotal	14,016	57,820	119,943	10,065	130,008	6,471	197	6,668	194,496	1.04
500,000 to 1,000,000:										
Birmingham, Ala.	2,052	8,140	14,661	—	14,661	2,283	—	2,283	25,084	1.74
Columbus, Ohio	2,696	10,308	23,291	—	23,291	446	—	446	34,045	1.17
Denver, Colo.	3,500	14,354	26,939	643	27,582	—	—	—	41,936	1.68
Honolulu, Hawaii	1,123	4,544	8,003	—	8,003	4,368	—	4,368	17,815	0.93
New Orleans, La.	1,941	9,138	16,690	2,926	19,616	539	1,437	1,976	30,730	0.82
Phoenix, Ariz.	3,084	13,157	21,430	—	21,430	—	—	—	34,587	1.26
Providence, R. I.	3,401	11,997	27,150	718	27,868	1,390	—	1,390	41,255	0.99
Subtotal	17,797	71,638	139,064	4,287	143,351	9,026	1,437	10,463	225,452	1.16
1,000,000 and over:										
Baltimore, Md.	5,966	24,796	48,698	5,558	54,256	4,602	351	4,953	84,005	1.35
Buffalo, N. Y.	3,417	13,638	31,416	4,637	36,053	761	—	761	50,472	0.89
Chicago, Ill.	19,210	76,656	135,788	18,426	154,214	39,080	2,208	41,288	272,158	0.81
Houston, Tex.	4,265	17,938	30,935	—	30,935	807	—	807	55,500	0.77
Los Angeles, Calif.	27,008	117,625	264,876	—	264,876	3,686	281	3,967	386,468	1.71
Minneapolis-St. Paul, Minn.	5,500	22,557	42,210	—	42,210	1,072	—	1,072	65,839	0.75
Philadelphia, Pa.	12,314	48,908	90,797	28,034	118,831	1,999	1,566	3,565	171,304	1.46
Subtotal	78,480	322,138	650,720	56,655	707,375	51,907	4,406	56,313	1,085,826	1.13
Total all SMSA's	121,717	499,202	1,000,756	71,659	1,072,415	72,044	6,040	78,084	1,649,701	1.11

^aIncludes earnings from state motor-fuel taxes at estimated consumption rates per mile of travel, and registration, operator license, and other fees either recorded collections in each area, or computed on basis of vehicle ownership in that SMSA. Local highway user imposts include the proceeds from motor fuel, bus and wheel taxes, automobile and truck licenses, and other fees levied on highway users within those jurisdictions.

^bIncludes taxes on motor fuel, truck, bus, and trailer excise, tires, tubes, and tread rubber, and vehicle-use taxes; does not include automobile excise, parts and accessories, and lubricating oil taxes which are general fund revenues.

^cIncludes parking fees.

^dExcludes Osage County.

imposts, just under 71 percent, and it is also second lowest in state and Federal road-user revenue income, with 63 percent. The proportion of state and Federal road-user tax income, excluding tolls, available to the SMSA's decreases as population increases, accounting for nearly 73 percent in the smallest population group and decreasing to about 61 percent in the largest. Income from local user imposts and state and local tolls, on the other hand, increases with the population size group of areas.

Road and Street Expenditures

Highway expenditures given in Table 11 and shown in Figure 3 are detailed for capital outlays between those expended on state-administered highways and those expended on local roads and streets. Because of the rural areas in the SMSA's, rural-municipal classification is given to the extent the data permitted.

The classification of construction expenditures by systems is frequently incomplete or inexact, or the rural-municipal segregation of expenditures on state-administered highways may not be complete. In the Baltimore, Maryland area, for instance (and this is perhaps the most extreme case), Federal aid of \$7.8 million, matched with

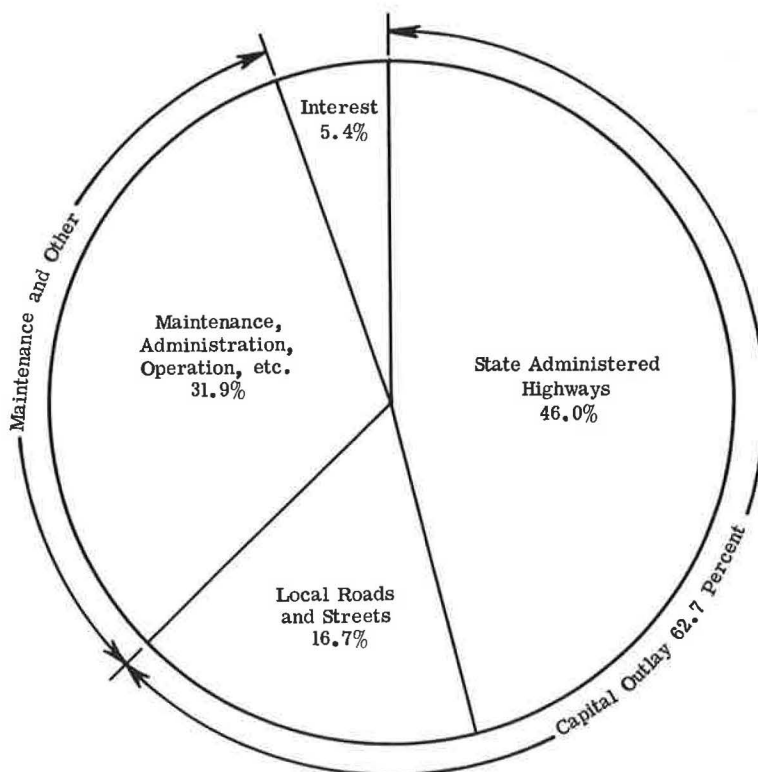


Figure 3. Expenditures for highways by all governmental agencies in 46 selected SMSA's, 1960.

\$5.5 million of local city funds, was spent in the city for the construction of Federal-aid route extensions which ordinarily would be extensions of state highways but which were under city jurisdiction because state jurisdiction stops at the Baltimore city limit. The capital expenditure of the entire \$13.4 million is given in Table 11 under local municipal streets rather than with those for municipal extensions of state-administered systems, as is the case for the other areas.

The split between rural and municipal expenditures is further complicated by the fact that the states' classification of rural expenditures includes Federal-aid urban outlay to the extent that the Federal-aid urban area extends beyond the corporate limits of cities.

Although such classification difficulties affect the columnar comparisons of individual areas attempted in Table 11, the total outlays are complete.

The total 1960 expenditures for highways were \$1,491 million in the 46 SMSA's. Capital outlay, consisting of right-of-way, engineering, and construction costs, amounted to \$935 million, 62.7 percent of total expenditures. Maintenance, operation, and administration expenditures were \$476 million or 31.9 percent, with interest and financing costs the remainder, \$80 million or 5.4 percent.

The broad classification of maintenance, administration, and operation requires some definition. The maintenance, administration and operation expenditures of local units are considered complete and are adequately reported. Local toll facility expenditures for maintenance and administration are equally well reported. At the state level, maintenance of condition and operating maintenance are included but costs of administration, collection, and state highway police and safety expenditures are not. These expenditures are not reported because this would involve an allocation by pro-rata which might be misleading. Nevertheless, earnings from highway use are expended for these functions.

Some indication of the cost to the states of collecting user taxes, administering state highway organizations, and supporting highway police and safety is given in Table 12. Costs of collection, including administrative and enforcement costs, were obtained by relating the total state costs to total state user revenues in each state and applying that relationship to state user tax earnings of the SMSA in that state. State highway administration costs were related to total capital and maintenance expenditures in each state, and this relationship was applied to state expenditures for capital outlay and maintenance of each SMSA. State highway police and safety education expenditures were derived only in total for all SMSA's by relating all travel in the SMSA's to the total nationwide travel. The amounts derived are indicated in Table 12.

Allied Street Functions

As stated earlier, the charges for state administration, collection, and police and safety are not included in Table 11. However, expenditures for indirect municipal street functions, usually termed allied street functions, are included with the maintenance and administration amounts. These functions consist of construction, maintenance and administration for street lighting, street cleaning, sidewalks, storm drainage,

TABLE 11
ROAD AND STREET EXPENDITURES IN 46 SELECTED SMSA's, 1960
(\$ x 1,000)

SMSA's By Population Groups	Capital Outlay ^a						Total Capital Outlay	Maintenance, Adminis- tration, Operation, etc. ^b	Interest	Total Expendi- tures	Debt Retire- ment	Total Disburse- ments
	State Administered Highways			Local Roads and Streets								
	Rural	Municipal	Total	Rural	Municipal	Total						
<250,000:												
Atlantic City, N. J.	1,044	51	1,095	165	293	458	1,553	4,608	298	6,459	406	6,865
Bay City, Mich.	3,773	99	3,872	41	745	786	4,658	1,614	14	6,286	90	6,376
Cedar Rapids, Iowa	907	370	1,277	888	911	1,799	3,076	2,552	56	5,684	279	5,963
Charleston, S. C.	2,817	353	3,170	89	84	163	3,353	1,334	—	4,687	—	4,687
Eugene, Ore.	7,849	—	7,849	1,763	1,335	2,898	10,747	3,084	54	13,885	246	14,131
Fargo, N. D.	10,225	985	11,250	1,572	1,552	3,124	14,374	2,361	273	17,008	536	17,544
Fitchburg-Lewiston, Mass.	99	—	99	46	206	252	351	1,289	12	1,652	140	1,792
Fort Wayne, Ind.	1,952	205	2,157	809	599	1,408	3,565	1,875	97	5,537	307	5,844
Great Falls, Mont.	2,834	70	2,904	42	241	283	3,167	1,443	241	4,671	475	5,346
Jackson, Miss.	2,287	476	2,765	505	1,033	1,538	4,303	2,598	295	7,196	2,485	9,681
Las Vegas, Nev.	3,011	24	3,035	180	883	1,063	4,066	1,850	41	5,939	834	6,773
Lewiston-Auburn, Me.	4	110	114	—	110	110	224	795	199	1,218	42	1,260
Lexington, Ky.	1,492	73	1,565	—	—	—	1,565	1,136	—	2,703	—	2,703
Little Rock-N. Little Rock, Ark.	4,739	12,698	17,437	99	1,530	1,629	19,066	2,964	141	22,171	345	22,516
Lynchburg, Va.	1,243	168	1,411	—	604	604	2,015	1,229	120	3,364	304	3,668
Macon, Ga.	1,559	1,559	3,118	345	135	480	2,039	915	24	2,978	40	3,020
Madison, Wis.	6,127	166	6,293	2,006	3,129	5,135	11,428	3,914	227	15,569	1,069	16,638
Sioux Falls, S. D.	4,428	2,762	7,210	1,004	241	1,245	8,455	1,539	14	10,008	20	10,028
South Bend, Ind.	153	16	169	477	436	913	1,082	2,800	25	3,907	575	4,482
Springfield, Mo.	2,911	642	3,553	67	307	374	3,927	1,656	29	5,612	330	5,942
Waterbury, Conn.	3,216	—	3,216	104	245	349	3,565	3,089	103	6,757	192	6,949
Subtotal	62,716	19,290	82,006	10,212	14,303	24,601	106,601	44,627	2,263	153,491	8,120	161,611
250,000 to 500,000:												
Albuquerque, N. M.	1,031	9,157	10,188	101	2,268	2,369	12,557	3,726	469	16,752	1,492	18,244
Charleston, W. Va.	655	—	655	—	37	37	692	3,426	116	4,234	176	4,410
Charlotte, N. C.	1,436	396	1,832	—	428	428	2,260	3,140	181	5,581	298	5,879
Jacksonville, Fla.	17,862	6,338	24,200	143	1,058	1,201	25,401	7,898	5,011	38,310	8,963	45,273
Nashville, Tenn.	7,465	8,694	16,159	636	1,126	1,752	17,911	3,454	276	21,641	866	22,507
Omaha, Neb.	8,205	2,740	10,945	3,156	3,708	6,864	17,809	6,510	402	24,721	2,875	27,596
Salt Lake City, Utah	7,931	174	8,105	778	685	1,463	9,568	3,777	—	13,045	—	13,045
Tacoma, Wash.	2,044	4,629	6,673	—	2,795	2,795	9,468	3,736	179	13,383	346	13,729
Tulsa, Okla.	3,347	419	3,766	1,739	1,856	3,595	7,361	5,151	1,757	14,269	1,547	15,816
Wichita, Kan.	3,058	2,894	6,552	1,152	4,228	5,380	11,932	4,637	1,330	17,899	7,116	25,015
Wilmington, Del.	6,342	1,958	8,300	48	943	991	9,291	6,436	1,145	10,772	2,245	20,017
Subtotal	59,976	37,399	97,375	7,743	19,132	26,875	124,250	51,491	10,866	186,607	24,925	211,532
500,000 to 1,000,000:												
Birmingham, Ala.	4,988	103	5,091	2,718	2,251	4,969	10,060	4,144	217	14,421	846	15,267
Columbus, Ohio	7,697	9,822	17,519	1,543	1,892	3,435	20,954	7,196	829	28,979	8,774	37,753
Denver, Colo.	5,920	5,033	10,953	1,925	1,677	3,602	14,555	10,458	357	25,015	755	25,770
Honolulu, Hawaii	2,877	4,584	7,461	—	3,334	3,334	10,795	7,801	475	19,071	446	19,517
New Orleans, La.	4,051	12,478	16,529	1,693	3,594	5,287	21,816	9,822	5,627	37,335	5,038	42,373
Phoenix, Ariz.	2,917	6,046	8,963	8,153	3,117	11,270	20,233	6,767	440	27,440	1,408	28,848
Providence, R. I.	3,197	20,518	23,715	459	4,372	4,831	28,546	12,793	459	41,798	2,038	43,836
Subtotal	31,647	58,584	90,231	16,191	20,237	36,428	126,659	50,031	8,372	194,062	19,605	213,667
1,000,000 and over:												
Baltimore, Md.	10,812	37	10,849	4,146	15,761	19,907	30,755	27,208	4,245	62,209	6,322	70,531
Buffalo, N. Y.	10,100	9,193	19,293	4,346	6,806	11,152	30,445	22,304	3,719	56,468	10,455	66,923
Chicago, Ill.	46,414	120,089	166,503	8,573	26,159	34,732	201,235	101,616	31,450	334,301	32,764	367,065
Houston, Tex.	—	35,954	35,954	2,549	12,087	14,635	50,589	16,949	4,403	71,941	10,190	82,131
Los Angeles, Calif.	38,885	59,884	98,769	15,494	31,647	47,141	145,910	78,583	1,692	226,185	4,546	230,731
Minneapolis-St. Paul, Minn.	7,923	33,772	41,695	6,046	11,761	17,807	59,502	27,096	1,511	88,109	5,729	93,838
Philadelphia, Pa.	23,110	20,842	43,952	3,912	12,195	15,707	59,459	46,787	11,259	117,505	18,506	134,011
Subtotal	137,244	279,571	416,815	44,665	116,416	161,081	577,896	320,543	58,279	956,718	88,514	1,045,232
Total all SMSA's	291,577	394,844	686,421	78,811	170,174	248,985	935,406	475,692	79,780	1,490,878	141,164	1,632,042

^aIn some instances, the classification of expenditures by system is not exact. In the Baltimore area for instance, the state and Federal-aid expenditures for municipal extensions of state highways are included with local municipal street expenditures because state highways stop at the Baltimore municipal limits. In other cases where the expenditures for rural and municipal state highways were not segregated the amounts are given under rural.

^bIncludes parking, policing, and allied street functions.

^cNo local capital outlay given in the report of expenditures for 1960.

TABLE 12
COMPARISON OF NATIONAL AND
SMSA EXPENDITURES, 1960

Item	Expenditures (\$ million)	
	Total All States and D. C.	Pro Rata Allocation to 46 SMSA's
State Highway administration	290	35
Cost of user- tax revenue collection	212	36
State highway police and safety	234	39

and maintenance and operation of parking meters and lots. Since the division of the expenditures for construction or maintenance was not given in many cases, the entire expenditure is included with maintenance and administration.

With the exception of parking facilities, expenditures for these purposes are of greater service to abutting property and in the protection of public health, safety, and security than they are to highways and motor vehicles. For example, storm sewers drain adjacent property as well as the streets, and street lighting provides safety and security to pedestrians and abutting occupants. Their inclusion may, therefore, be regarded as an expenditure offset against the omission of the allocated expenditures for state highway administration, user-tax revenue collection, and state highway police.

The funds for allied street functions are mainly derived from property taxes and assessments and from local general revenue funds. Road-user revenues, state and local, are used to some extent, chiefly when outlays for those purposes are incidental to highway construction or maintenance operations. The amounts in Table 3 include income from these various sources for indirect municipal street functions, and the expenditures, amounting to \$134 million, are included with the amounts in Table 11. Table 13 gives a summary of the nationwide expenditures for allied street functions in 1960 and the corresponding expenditures in the 46 SMSA's.

Road-User Earnings

Table 10 gives the motor-vehicle user tax and toll earnings for each SMSA, and Figure 4 shows the proportion of the total earnings, by Federal, state, and local sources.

TABLE 13
NATIONAL DISBURSEMENT TOTALS FOR PARKING FACILITIES AND ALLIED STREET
FUNCTIONS AND CORRESPONDING OUTLAYS IN 46 SMSA's, 1960^a
(\$ × 1,000)

Item	Parking Facilities	Allied Street Functions					Total Including Parking
		Street Lighting	Street Cleaning	Side- walks	Storm Sewers	Total	
Capital outlay	55,757	33,615	2,853	19,277	87,393	143,138	198,895
Maintenance and operation	37,093	176,559	67,290	4,425	14,651	262,925	300,018
Interest on debt	13,694	—	—	—	—	11,648 ^b	25,342
Total expenditures	106,544	—	—	—	—	417,711	524,255
Debt retirement	18,658	—	—	—	—	31,499 ^b	50,157
Fund transfers:							
To municipal street funds	73,974	—	—	—	—	—	73,974
To allied street functions	2,310	—	—	—	—	—	2,310
To county road funds	523	—	—	—	—	—	523
To other purposes	5,142	—	—	—	—	6,977	12,119
Total	81,949	—	—	—	—	6,977	88,926
Total disbursements	207,151	—	—	—	—	456,187	663,338
Amounts included in expenditures of 46 SMSA's	16,370	59,111	19,449	2,876	36,647	118,083	134,553

^aData derived from Ref. 14.

^bDebt service for these functions grouped.

The proportions of earnings from Federal, state and local levies are as follows: state motor fuel taxes, and motor vehicle registration and other fees were 60.7 percent of total earnings, double those realized from the Federal excise group; local levies on road users amounted to 4.4 percent of the total and are equal to the earnings of the state level toll facilities; and tolls from all facilities, state and local were \$79 million or 4.7 percent.

By dividing the earnings by the vehicle-miles, the total road-user earnings of \$1,650 million are equal to a payment of \$0.0136 per vehicle-mile of travel, of which \$0.041 is from Federal trust fund excise taxes and \$0.088 from state taxes and tolls. Local user levies account for an average per vehicle-mile earning of slightly less than \$0.007.

By comparison, the United States total 1960 road-user taxes (10) amounted to \$8,211 million, and the corresponding total travel (2, p. 80) was 718,845 million vehicle-miles. These two items compute to an average earning rate of \$0.0114/veh-mi of travel. The \$0.0136/veh-mi earning rate computed for the SMSA's results in an earning, per vehicle-mile of travel, 19 percent greater than the national average. The motor fuel consumption differential estimated for the SMSA's accounted for approximately 14 of the 19 percent of this greater earning rate (Table 5); the remainder is accounted for by the fact that the annual travel in the SMSA per vehicle registered therein (a synthetic figure since much of the travel is contributed by vehicles from outside the area) runs low, 8,497 mi/yr, in comparison with the national per-vehicle average, which was 9,652 in 1960. When the annual mileage is low, the effect of registration fees and others not varying with mileage is to cause the payment per vehicle-mile to be high.

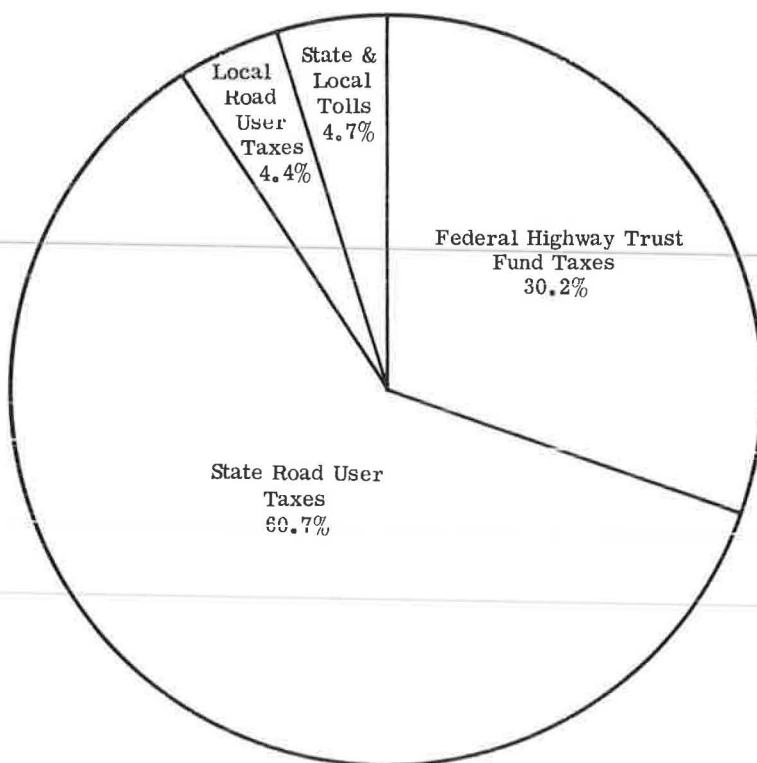


Figure 4. Estimated earnings of Federal highway trust fund taxes, state and local road user levies, and tolls in 46 selected SMSA's, 1960.

TABLE 14
RATIOS OF EARNINGS TO EXPENDITURES
MORE OR LESS THAN 1.00

Population	No. Having Ratios >1.00	Group Ratio, Earnings to Expenditures
<250,000	12 out of 21	0.94
250,000 - 500,000	7 out of 11	1.04
500,000 - 1,000,000	4 out of 7	1.16
>1,000,000	3 out of 7	1.13
All SMSA's	26 out of 46	1.11

The last column of Table 10 gives the ratio of motor-vehicle user tax earnings to total current highway expenditures in 1960 as given in Table 11. In 26 of the 46 SMSA's, earnings of user taxes were greater than the total current expenditures for highways, the ratio of totals being 1.11.

The ratios for the several population groups vary generally upward with size of place, but there is no similar consistency in the number of places having ratios of earnings to expenditures more or less than 1.00, as is indicated in the recapitulation in Table 14.

SUMMARY COMPARISONS

The information in Tables 3, 10, and 11 are summarized in Table 15, which provides a ready comparison of the road and street income, expenditures, and user earnings of the 46 SMSA's. In the 46 SMSA's studied, road-user income sources provided 73.4 percent of the revenue income and property taxes and assessments and other sources provided 26.6 percent. Although the earnings accruing from travel in these SMSA's amounted to \$1,650 million, the amount of road-user taxes, fees, and tolls applied to these SMSA's was only \$1,044 million, or 63.2 percent of the amount earned.

The road-user earnings from the travel in these SMSA's is of the same order, at \$1.6 billion, as the total receipts for highways, including \$378 million from nonuser sources and \$223 million of borrowing, and the total expenditures which include more than \$141 million of debt retirement.

TABLE 15
SUMMARY COMPARISONS OF HIGHWAY INCOME, EXPENDITURES, AND ROAD-USER EARNINGS OF 46 SELECTED SMSA's, 1960

Item	SMSA Population Group									
	<250,000		250,000 to 500,000		500,000 to 1,000,000		1,000,000 and more		Totals, 46 SMSA's	
	Amount (\$ × 1,000)	Percent	Amount (\$ × 1,000)	Percent	Amount (\$ × 1,000)	Percent	Amount (\$ × 1,000)	Percent	Amount (\$ × 1,000)	Percent
Road and street income:										
Imposts on highway users:										
State and Federal taxes	110,676	72.78	110,851	65.54	119,867	63.09	552,789	60.72	894,183	62.90
Local	4,705	3.10	6,471	3.83	9,026	4.75	51,907	5.70	72,109	5.07
Tolls	652	0.43	10,262	6.07	5,724	3.01	61,061	6.71	77,699	5.47
Subtotal	116,033	76.31	127,584	75.44	134,617	70.85	665,757	73.13	1,043,991	73.44
Other revenue income:										
Property taxes and assessments	17,970	11.82	24,738	14.63	21,769	11.46	88,627	9.73	153,104	10.77
General fund appropriations	15,297	10.06	12,269	7.25	24,085	12.68	122,149	13.42	173,800	12.22
Miscellaneous taxes and fees	2,756	1.81	4,539	2.68	9,523	5.01	33,878	3.72	50,696	3.57
Subtotal	36,023	23.69	41,546	24.56	55,377	29.15	244,654	26.87	377,600	26.56
Total revenue income	152,056	100.00	169,130	100.00	189,994	100.00	910,411	100.00	1,421,591	100.00
Investment income and borrowing	11,552		24,889		29,678		156,727		222,846	
Total receipts	163,608		194,019		219,672		1,067,138		1,644,437	
Road and street expenditures:										
Capital outlay:										
On State highways	82,000	53.42	97,375	52.18	90,231	46.50	416,815	43.57	686,421	46.04
On local roads and streets	24,601	16.03	26,875	14.40	36,428	18.77	161,081	16.83	248,985	16.70
Subtotal	106,601	69.45	124,250	66.58	126,659	65.27	577,896	60.40	935,406	62.74
Maintenance, administration, operation, etc.	44,627	29.08	51,491	27.60	59,031	30.42	320,543	33.51	475,692	31.91
Interest on debt	2,263	1.47	10,866	5.82	8,372	4.31	58,279	6.09	79,760	5.35
Subtotal	46,890	30.55	62,357	33.42	67,403	34.73	378,822	39.60	555,472	37.26
Total expenditures	153,491	100.00	186,607	100.00	194,062	100.00	956,718	100.00	1,490,878	100.00
Debt retirement	8,120		24,925		19,605		88,514		141,164	
Total disbursements	161,611		211,532		213,667		1,045,232		1,632,042	
Motor vehicle user tax earnings:										
Federal trust fund taxes	47,606	33.08	57,820	29.73	71,638	31.78	322,138	29.67	499,202	30.26
State motor vehicle user taxes	91,029	63.25	119,943	61.67	139,054	61.68	650,720	59.93	1,000,756	60.66
Local motor vehicle user taxes	4,640	3.22	6,471	3.33	9,026	4.00	51,907	4.78	72,044	4.37
Tolls	652	0.45	10,262	5.27	5,724	2.54	61,061	5.62	77,699	4.71
Total motor vehicle user tax earnings	143,927	100.00	194,496	100.00	225,452	100.00	1,085,826	100.00	1,649,701	100.00

It is not known, of course, whether the total of all metropolitan areas of the country, if organized in this manner, would compare similarly, but it is reasonable to speculate that they would.

During a period of extensive highway construction, of which 1960 is representative, expenditures in any one SMSA may well exceed earnings. If, in a given year a sizeable portion of a state's construction program falls within a SMSA, this occurrence would have a major effect on the earnings-expenditure comparison, and it might not be repeated in the following years. The relationship between earnings and expenditures given here is valid for only one year, but the average for 46 SMSA's may be taken as reasonably indicative of the current trend.

TABLE 16
STATE HIGHWAY DEPARTMENT EXPENDITURES FOR CAPITAL OUTLAY IN 46 SELECTED SMSA'S 1960 AND 1961 AND COMPARISON
WITH 1960 MOTOR VEHICLE ROAD-USER EARNINGS^a

SMSA's By Population Groups	Capital Outlay by State Highway Departments on State and Local Administered Highways (\$ × 1,000)		1961 Increase or Decrease (\$ × 1,000)	Total Expenditures 1960 (Table 11) (\$ × 1,000)	Adjusted Expenditures by Substituting 1961 for 1960 State Capital Outlay (\$ × 1,000)	1960 Road User Earnings (\$ × 1,000)	Ratio of User Earnings to Adjusted Expenditures	Ratio of User Earnings to 1960 Expenditures (Table 10)
	1960	1961						
	<250,000:							
Atlantic City, N. J.	1,055	2,363	+ 1,308	6,459	7,767	12,445	1.60	1.93
Bay City, Mich.	3,913	2,375	- 1,538	6,286	4,748	5,105	1.08	0.81
Cedar Rapids, Iowa	1,617	2,377	+ 760	5,684	6,444	7,323	1.14	1.29
Charleston, S. C.	3,170	6,209	+ 3,039	4,687	7,726	8,435	1.09	1.80
Eugene, Ore.	8,102	3,767	- 4,335	13,885	9,550	9,329	0.98	0.67
Fargo, N. D.	11,769	5,389	- 6,380	17,008	10,628	5,797	0.55	0.34
Fitchburg-Leominster, Mass.	106	274	+ 168	1,652	1,820	4,790	2.63	2.90
Fort Wayne, Ind.	2,157	2,181	+ 24	5,537	5,561	7,566	1.36	1.37
Great Falls, Mont.	3,004	1,815	- 1,089	4,871	3,782	3,359	0.89	0.69
Jackson, Miss.	2,765	2,730	- 35	7,196	7,161	7,775	1.09	1.08
Las Vegas, Nev.	3,044	2,850	- 194	5,939	5,745	5,577	0.97	0.94
Lewiston-Auburn, Me.	110	27	- 83	1,218	1,135	2,678	2.36	2.20
Lexington, Ky.	1,557	3,649	+ 2,092	2,703	4,795	5,579	1.16	2.06
Little Rock-N. Little Rock, Ark.	17,536	13,352	- 4,184	22,171	17,987	11,394	0.63	0.31
Lynchburg, Va.	1,411	1,173	- 238	3,364	3,126	5,317	1.70	1.58
Macon, Ga.	1,627	1,462	- 165	2,978	2,833	5,168	1.82	1.74
Madison, Wis.	6,746	15,300	+ 8,552	15,569	24,121	11,712	0.49	0.75
Sioux Falls, S. D.	7,440	10,111	+ 2,671	10,000	12,670	4,620	0.36	0.46
South Bend, Ind.	169	295	+ 126	3,907	4,033	7,341	1.82	1.88
Springfield, Mo.	3,552	7,431	+ 3,879	5,612	9,491	6,237	0.66	1.11
Waterbury, Conn.	833	4,286	+ 3,953	6,757	10,710	6,380	0.60	0.94
Subtotal	81,585	89,936	+ 8,351	153,491	161,842	143,927	0.89	0.94
250,000 to 500,000:								
Albuquerque, N. M.	10,076	8,216	- 1,860	16,752	14,892	11,269	0.76	0.67
Charleston, W. Va.	655	3,708	+ 3,053	4,234	7,287	12,495	1.71	2.95
Charlotte, N. C.	1,832	1,330	- 502	5,581	5,079	9,347	1.84	1.67
Jacksonville, Fla.	11,769	5,761	- 6,008	38,310	32,302	26,777	0.83	0.70
Nashville, Tenn.	16,258	11,558	- 4,700	21,641	16,941	16,937	1.00	0.78
Omaha, Neb.	11,697	12,189	+ 492	24,721	25,213	24,757	0.98	1.00
Salt Lake City, Utah	8,270	13,898	+ 5,628	13,045	18,673	14,094	0.75	1.08
Tacoma, Wash.	6,994	9,531	+ 2,537	13,363	15,920	17,122	1.08	1.28
Tulsa, Okla.	3,771	5,630	+ 1,859	14,269	16,128	23,770	1.47	1.67
Wichita, Kan.	6,914	7,032	+ 118	17,899	18,017	15,137	0.84	0.85
Wilmington, Del.	7,840	6,650	- 1,190	12,772	15,642	22,791	1.46	1.36
Subtotal	86,056	85,543	- 513	186,607	186,094	194,496	1.05	1.04
500,000 to 1,000,000:								
Birmingham, Ala.	5,314	3,964	- 1,350	14,421	13,071	25,084	1.92	1.74
Columbus, Ohio	18,244	14,347	- 3,897	28,979	25,082	34,045	1.36	1.17
Denver, Colo.	11,069	11,335	+ 266	25,018	25,264	41,936	1.66	1.68
Honolulu, Hawaii	7,401	0,015	- 7,386	10,071	19,625	17,815	0.91	0.93
New Orleans, La.	8,099	7,037	- 1,062	37,335	36,273	30,730	0.85	0.82
Phoenix, Ariz.	2,940	10,757	+ 7,817	27,440	35,257	34,587	0.98	1.26
Providence, R. I.	24,051	23,175	- 876	41,798	40,922	41,255	1.01	0.99
Subtotal	77,198	78,630	+ 1,432	194,062	195,494	225,452	1.15	1.16
1,000,000 and over:								
Baltimore, Md.	26,034	37,928	+ 11,894	62,209	74,103	84,005	1.15	1.35
Buffalo, N. Y.	17,243	14,390	- 2,853	56,468	53,615	50,472	0.94	0.89
Chicago, Ill.	120,734	60,705	- 60,029	334,301	274,272	272,158	0.99	0.81
Houston, Tex.	35,142	44,338	+ 9,196	71,941	81,137	55,580	0.69	0.77
Los Angeles, Calif.	99,147	182,551	+ 83,404	226,185	309,589	386,460	1.25	1.71
Minneapolis-St. Paul, Minn.	42,470	49,586	+ 7,116	88,109	95,225	65,839	0.69	0.75
Philadelphia, Pa.	41,921	29,203	- 12,718	117,505	104,787	171,304	1.63	1.46
Subtotal	382,691	418,701	+ 36,010	956,718	992,728	1,085,826	1.09	1.13
Total, all SMSA's	627,530	672,810	+ 45,280	1,490,878	1,536,158	1,649,701	1.07	1.11

^aAlthough local agencies undertake costly facilities also, the impact of interstate construction under state jurisdiction is most certain to affect large and small population areas.

COMPARISONS WITH 1961 DATA

The first year for which the complete highway finance data for SMSA's were compiled so that it was possible to survey income and expenditures for a 1-yr period was 1960. Since this analysis was undertaken, 1961 data have become available in sufficient detail to permit a comparison of 1960 and 1961 state highway department expenditures, excluding toll facility expenditures, for the 46 SMSA's, with a view to examining any major fluctuations in the two years.

Table 16 indicates how state highway department expenditures may vary from year to year in a SMSA. In this table, the 1960 and 1961 state highway department expenditures for capital improvements on state and local highways are compared, with the increase or decrease given in column 3. The 1960 amount of \$628 million is a part of the \$686 million capital outlay on state highways of Tables 11 and 15, but excludes local expenditures on state-administered highways and state toll-facility expenditures.

Column 4 of Table 16 duplicates the total road and street expenditures of \$1,491 million given in Table 11, then adjusts these amounts for each SMSA by substituting the 1961 state capital outlay for that of 1960. The adjusted expenditure is then compared with the 1960 road user earnings of Table 10, and in column 7 of Table 16 a new ratio of earnings to expenditures is given on this basis.

The result of this examination demonstrates that there is a rather stable relationship between earnings and expenditures for the two successive years. In the last two columns of the table the ratios of the 1960 data and the ratios based on the modified 1961 expenditures are compared.

COMPARISONS OF DATA FOR INDIVIDUAL SMSA's

The ratio of motor-vehicle user earnings to expenditures for the different SMSA's varies over a wide range. The lowest ratio of earnings to expenditures, 0.34, is found in the Fargo, N. D., SMSA, and the highest ratio, 2.95, is in the Charleston, W. Va., area. Attempts to rationalize the differences from the standpoint of population, travel, amount of land area, or population density fail to provide a complete answer. Some effect, of course, is felt through the earnings per vehicle-mile of travel (total earnings divided by total travel) which in the cases cited provides the North Dakota area with an earning of \$0.01283/mi and the West Virginia area with an earning rate of \$0.01534. This difference can be mainly ascribed to a \$0.05 and \$0.06 gasoline tax rate in North Dakota (the rate changed from \$0.05 to \$0.06 in 1960), compared with a \$0.07/gal gasoline tax in West Virginia.

The comparison of capital expenditures for 1960 and 1961 given in Table 16, however, shows that in the Fargo area state expenditures for capital outlay on state and local highways amounted to \$11.8 million in 1960 and \$5.4 million in 1961, while in Charleston \$0.7 million was expended by the state for capital improvements on state and local highways in 1960, compared with \$3.7 million in 1961.

More striking perhaps is the situation in the SMSA's of Chicago and Los Angeles. In the former, capital expenditures were \$121 million in 1960 and \$61 million in 1961, a reduction in expenditures which, if applied to the 1960 earnings, would be sufficient to bring the earnings-expenditure ratio to nearly 1.0. In Los Angeles, capital outlays of \$99 million in 1960 were followed by an expenditure of \$183 million in 1961. In this case, the adjusted expenditures compared with 1960 user earnings would retain a ratio of more than 1.0.

The greatest extremes in the earnings-expenditure comparisons given in Table 10 appear in the under 250,000 population group. Two areas in this group had a ratio under 0.50, and five under 0.70, whereas only one area in the population groups over 250,000, Albuquerque, had an earnings-expenditure ratio under 0.70. At the other extreme, eight areas in the under 250,000 population group had an earnings-expenditure ratio over 1.50, 38 percent of the group, compared with 6 areas in all of the remaining population groups.

The more constant relationship in the areas over 250,000 population may signify that at least for 1960—and to the extent that the substituted 1961 state highway department expenditure comparisons are indicative—there is a greater stability between the

user earnings and expenditures in the larger metropolitan areas, even during this period of extensive highway construction.

REFERENCES

1. U. S. Bureau of the Census. United States Census of Housing, 1960. Table 16, Ser. HC(1).
2. U. S. Bureau of Public Roads. Highway Statistics 1960.
3. Supplementary Report of the Highway Cost Allocation Study. U. S. Govt. Printing Office, House DOC. No. 124, 1965.
4. Improved Transportation For Southeastern Pennsylvania. Bur. of Municipal Res., and Penn. Econ. Leag., Philadelphia, Pa., May 1960.
5. Bevis, Howard W. The Application of Benefit Cost Ratios to an Expressway System. Highway Research Board Proc., Vol. 35, pp. 63-75, 1956.
6. Carter, Arthur A. Increasing the Traffic-Carrying Capability of Urban Arterial Streets. (and appendices) U. S. Bur. of Pub. Rds., Washington, D. C., May 1962.
7. Claffey, Paul J. Time and Fuel Consumption for Highway User Benefit Studies. Highway Research Board Bull. 276, pp. 20-34, 1960.
8. Kent, Malcolm F. Fuel and Time Consumption Rates for Trucks in Freight Service. Highway Research Board Bull. 276, pp. 1-19, 1960.
9. Sawhill, Roy B., and Firey, Joseph C. Motor Transport Fuel Consumption Rates and Travel Time. Highway Research Board Bull. 276, pp. 27-46, 1960.
10. U. S. Bureau of Public Roads. Total Receipts for Highways, All Units of Government. Table HF-1, 1962, News release, Jan. 13, 1963.
11. Illinois Motor Vehicle Use Study. Illinois Div. of Highways, p. 205, Oct. 1961.
12. Lieder, Nathan. Passenger Car Fuel Consumption Rates. U. S. Bur. of Pub. Rds., Vol. 32, No. 5, p. 119, Dec. 1962.
13. U. S. Bureau of Public Roads. Motor vehicle use studies, Highway Needs and Econ. Div., Unpubl., Sept. 1958.
14. U. S. Bureau of Public Roads. Highway Statistics 1961. Table UF-12-1960, p. 79, 1963.