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## APPENDIX K

### General Government

GENERAL government, as defined by the Commerce Department, comprises those government activities which are financed mainly by tax revenue or debt creation. If direct charges for services rendered are made, these constitute but a nominal part of operating costs, in contrast to the government enterprises whose operations are essentially commercial in character.

#### *Output*

The very fact that the services of general government are not sold means that there is no market valuation in the conventional sense and no prices whereby the estimated value of output might be deflated. In many cases it is difficult to visualize and define the many types of real services that are performed by government. Insofar as such services can be defined, it is at least theoretically possible to choose physical-volume measures that approximate the changes in the amount of real services provided—just as the number of pieces of mail handled may be used as a rough measure of Post Office Department services. For example, we might use the number of student days of attendance to approximate the real output of the public school system and the number of vehicle miles traveled as a measure of the output of the public highway system.<sup>1</sup> Work measurement systems in a number of federal agencies with fairly routinized operations, such as the Veterans Administration, Internal Revenue Service, and Social Security Administration, provide raw materials for possible output and productivity indexes.<sup>2</sup> But lack of data for other agencies, and the artificial nature of possible measures, particularly in areas of general administration, have precluded a direct attempt to measure government output, especially since our resources for experimental work were limited.

The Commerce Department estimates of real gross and net government product are patently unsuited for productivity analysis, since they are obtained by multiplying government employment or manhours worked,

<sup>1</sup> See John W. Kendrick, "The Estimation of Real National Product," *A Critique of the United States Income and Product Accounts*, Studies in Income and Wealth, Volume 22, Princeton University Press (for NBER), 1958.

<sup>2</sup> Experimental work along these lines is reported by Henry D. Lytton, "Recent Productivity Trends in Federal Government: An Exploratory Study," *The Review of Economics and Statistics*, November 1959.

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by category, by base-period average compensation. Output and input have the same movements, with no allowance for productivity change. Furthermore, the capital factor is completely neglected since the present Commerce concept does not include the value of government capital services in the national product.

The Kuznets estimates of national product do implicitly include government output—in terms of final services to consumers and of intermediate services to business. We do not, however, present the implicit government output series since it is not in itself a satisfactory measure. Kuznets recognizes that his treatment of government is statistically imprecise, and has outlined what he considers a more satisfactory method.<sup>3</sup> As yet, his “product specific” approach has not been translated into quantitative terms.

### *Employment, Manhours, and Labor Compensation*

The general-government estimates have been drawn up in terms of four major components: federal civilian employees and members of the armed forces, and nonschool and school employees of state and local governments. The employment and labor compensation estimates from 1929 forward are those prepared by the Commerce Department, explained and presented in the *National Income Supplement, 1954 Survey of Current Business*. The following section will describe the estimation procedure in earlier years and the derivation of average hours throughout. The employment estimates are presented in Table K-I.

#### FEDERAL GOVERNMENT

In preparing estimates of real labor input and of the labor compensation part of national income or product originating in the federal government, it is useful analytically as well as statistically to deal with civilian government and armed forces separately. The Commerce Department also treated work relief as a separate category in 1933–43, but in the summary tables we have lumped this with the rest of civilian government.

*Employment.* Except for work relief, the Commerce Department's estimates of federal employment on a full-time equivalent basis are identical with the full-time and part-time estimates. The 1929 Commerce estimate was extrapolated to 1897 by estimates derived from those of Fabricant,<sup>4</sup> which were based on Civil Service Commission reports. From his estimates of civilian full-time equivalent employment were subtracted estimates of the full-time equivalent number of Post Office Department

<sup>3</sup> Simon Kuznets, “Government Product and National Income,” *Income and Wealth, Series I*, Cambridge, England, Bowes and Bowes, 1951.

<sup>4</sup> Solomon Fabricant, *The Trend of Government Activity in the United States since 1900*, New York (NBER), 1952, Table B 6, pp. 182–84 and Table B 4, p. 76.

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employees. The resulting series is somewhat higher in 1929 than the Commerce estimates, in part because the Fabricant figures include employees of enterprises other than the Post Office. By using his estimates as an extrapolator we are assuming that the enterprise proportion (and discrepancy) remained constant in earlier years. Since the implied proportion is only 10 per cent in 1929, moderate changes in enterprise relative to general-government employment would have little effect on the validity of the Commerce series as extrapolated.

From 1897 back, we have used estimates of paid employees in the executive branch, based on Civil Service Commission records.<sup>5</sup> Since the great bulk of federal civilian government employment is in the executive branch, the omission of estimates for the legislature and judiciary is of no great moment. More serious is the fact that the series, while excluding the armed forces, includes Post Office employment. We have, therefore, deducted the estimates of Post Office employment described in Appendix J and used the residual to extrapolate the Fabricant series. Although we were not in a position to assess the reliability of the estimates prior to 1897, it is reassuring that the figures show much the same upward trend relative to population as shown by the estimates since 1897. Missing years in the earlier period were interpolated on a straight-line basis.

The estimates of the strength of the armed forces are consistent with those of M. Slade Kendrick.<sup>6</sup> His estimates are for fiscal years; by reference to the underlying worksheets we have obtained estimates relating to calendar years. For most years, the estimates are for armed forces strength on June 30. For 1898-1902 and 1917-22, inclusive, the estimates are averages of data for the months of the calendar years; data for a number of missing months had to be interpolated. The estimates are quite close to those given by Fabricant,<sup>7</sup> except for a few of the war years. The Slade Kendrick estimates were based on data which were revised subsequent to the Fabricant volume, however, and in some cases represent more exhaustive investigation of original sources. The estimate for 1929 is between 2 and 3 per cent higher than the Commerce estimate for that year, mainly because nonresidents of the United States are excluded from the Commerce figures. The Commerce series was extrapolated by the National Bureau estimates, a procedure that involves the assumption that the proportion of nonresident members of the armed forces remained constant in the earlier period.

*Labor compensation.* The compensation of federal civilian employees in years before 1929 was obtained as the product of employment and the

<sup>5</sup> *Historical Statistics of the United States, 1789-1945*, Dept. of Commerce, 1949, Series P 62.

<sup>6</sup> *A Century and a Half of Federal Expenditures*, Occasional Paper 48, New York (NBER), 1955, Table B-3.

<sup>7</sup> *Op. cit.*, Table B 5.

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average compensation per employee. The latter series was based on an estimate of average compensation in 1929 derived from the Commerce figures, extrapolated as follows.

Average pay per federal civilian employee (excluding the Post Office) was computed for 1903, 1913, 1923, and 1929, from the worksheet detail underlying the estimates presented in Fabricant,<sup>8</sup> as provided by Robert Lipsey. Fabricant's estimates, in turn, were based on budget payroll data for 1923 and 1929 and on average pay estimates in the earlier years.<sup>9</sup> Annual interpolations and extrapolations to 1892 were based on average wage-salary rates computed from Kuznets<sup>10</sup> for the period from 1919 to 1929 and on estimates of the average annual earnings of government employees in the District of Columbia presented by Douglas.<sup>11</sup> Owing to a lack of information relating to the compensation of federal civilian employees prior to 1892, we have extrapolated compensation back by the average salary of teachers in public elementary schools, based on estimates of the Office of Education as described below.

*Average hours and manhours worked.* Average hours worked per year by federal civilian employees were estimated separately for "white collar" employees subject to Civil Service Commission regulation, "blue collar" workers under wage board jurisdiction, and work relief employees. Information regarding the length of the workday, number of holidays, and leave privileges was assembled from the various annual volumes of *Civil Service Act and Rules, Statutes, Executive Orders, and Regulations* and was checked against an unpublished list of changes in these variables that is on file at the Employment Statistics Office of the Civil Service Commission. The method is essentially the same as that used by Douglas;<sup>12</sup> a few differences in results reflect the more detailed information available to us.

In computing the number of days worked per year, we assumed that 80 per cent of allowable annual leave and 67 per cent of allowable sick leave were used. These ratios were based on a study of leave for 1947.<sup>13</sup> Sundays and holidays were deducted in full, along with the allowable portion of Saturdays (up until Saturday work was abandoned). The chief influence on average hours worked per year was the number of days worked, since the length of the full workday has been around 7 hours, except in World War II, when it was increased to 8, and prior to 1904, when it seems to have been 6.5.

<sup>8</sup> *Ibid.*, Table D 1.

<sup>9</sup> *Ibid.*, pp. 225-226.

<sup>10</sup> Simon Kuznets, *National Income and Its Composition, 1919-1938*, New York (NBER), 1941, Vol. II, Tables G-2 and G-7.

<sup>11</sup> Paul H. Douglas, *Real Wages in the United States, 1890-1926*, Boston, Houghton Mifflin, 1930, p. 375.

<sup>12</sup> *Ibid.*, pp. 191ff.

<sup>13</sup> *Sick and Annual Leave*, Senate Document No. 126, 80th Cong., 2d sess., March 5, 1948.

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The situation was somewhat different as regards "wage board" employees. Here, the standard workday has been 8 hours; the workweek was 6 days until 1934, when it was reduced to 5 days. The same adjustments for holidays and leave were used as for Civil Service workers. Total federal civilian employment (except work relief) was roughly divided between the two categories of workers for the purpose of weighting by hours. Weights were determined on the basis of the employment statistics of the Civil Service Commission since World War II, and before then by the ratio of CSC positions to total paid employees in the Executive departments.<sup>14</sup>

Manhours on work relief were calculated simply as the product of full-time equivalent employment, 50.6 weeks per year and 40 hours per week. This is entirely consistent with the Commerce Department series, since "full-time equivalent employment has been computed for all years by use of a 40-hour week as a measure of full-time employment."<sup>15</sup>

As far as the armed forces are concerned, manhours are probably no more significant a measure than is "strength" in terms of numbers of men. That is, much of the security provided by the armed services lies in their readiness for combat in case of necessity, and service men are always on call even when not actually on duty. Yet, in order to provide estimates on a basis comparable with manhours worked in civilian pursuits, we have multiplied armed forces employment by average hours worked by civilian employees of the federal government under Civil Service Commission jurisdiction. Military and civilian government personnel work together in many types of activity and have observed the same hours and holidays. Furthermore, leave privileges have been similar. While use of the same hours series for military as for civilian employees of the federal government is an expedient, it is not basically unreasonable, at least for peacetime.

### STATE AND LOCAL GOVERNMENT

In this area the several variables in which we are interested have been estimated in terms of two major groupings: school and nonschool. The basic data of the Governments Division of the Bureau of the Census are available in terms of additional categories: state governments, counties, cities, towns, villages, etc., but we have followed the Commerce Department and worked in terms of the two major categories.

*Employment.* The Commerce Department estimate of nonschool employment in 1929 was extrapolated to 1900 by the estimates of Fabricant,<sup>16</sup> available for the total for 1900, 1902, and 1910, and on an annual basis from

<sup>14</sup> *Historical Statistics*, Series P 65 and P 62.

<sup>15</sup> *National Income Supplement, 1954*, p. 197, n. 7.

<sup>16</sup> *Op. cit.*, Table B 13.

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1920 to 1929. His estimates prior to 1929 for state and municipal government employment are based on population-weighted average government employment per capita in a sample of states and cities. Local government employment was estimated independently for 1902, based on Census nonschool expenditures divided by average expenditures per employee in states and cities extrapolated to 1900 by state and city employment. The total nonschool employment figures were interpolated by Fabricant for the years between 1900 and 1929 mentioned above on the basis of the state and municipal employment estimates. We have interpolated the total for 1905 and 1915 by municipal government employment,<sup>17</sup> the remaining intervening years were interpolated on a straight-line basis.

It was noted that in 1900, 1902, 1920, and subsequent years, the ratio between total nonschool and school employment exhibited a remarkably regular upward trend. In order to obtain estimates of nonschool employment from 1899 to 1869, we extrapolated the relationship between nonschool and school employment and applied the calculated ratios to the estimates of school employment, which are available annually throughout the entire period.

The annual estimates of school employment from 1929 to 1909 are those presented by Fabricant,<sup>18</sup> which in turn are extrapolations of the Commerce Department figures, using estimates by Kuznets and King derived from basic data gathered by the Office of Education. From 1911 to 1869, annual estimates of the number of teachers employed in primary and secondary schools were based on Office of Education data.<sup>19</sup> Estimates of the numbers of persons employed in higher educational institutions and in all other schools, were obtained for 1890, 1900, and 1910 from reports of the Office of Education; the proportions of employment assignable to public institutions were calculated from tabulations for 1918 and applied to the estimates for the earlier decennial years. Interpolations were made between decennial figures for employment in higher education on the basis of annual enrollment estimates, and extrapolation back to 1869 was by the number of students graduated from college.<sup>20</sup> The estimated public portion of other school employment was interpolated and extrapolated on a straight-line basis. The effect of the roughness of the estimates of employment in schools other than primary and secondary is mitigated by the fact that this portion accounted for only about 7 per cent of the total in 1910, and less in earlier years. It was considered a gain in accuracy over using the relatively reliable primary and secondary school employment series alone, since a distinct increase in the ratio of employment in

<sup>17</sup> *Ibid.*, Table B 19.

<sup>18</sup> *Ibid.*, Table B 11.

<sup>19</sup> *Statistical Abstract of the United States, 1922*, Dept. of Commerce, p. 103.

<sup>20</sup> *Biennial Survey of Education, 1936-38*, Office of Education Bulletin 1940, No. 2, 1942.

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higher education to total school employment is evident in the estimates for selected years from 1890 forward.

The estimates from 1910 back were on a school-year basis. We have converted them to a calendar-year basis by the method used by Kuznets, weighting the figures for the school year ending in the given calendar year 2, and those for the following school year 1. The converted estimates were then linked to the Commerce series as extrapolated to 1909 by the calendar-year estimates of Kuznets and King.

*Labor compensation.* Compensation of state- and local-government non-school employees was obtained in 1929 as the sum of the Commerce Department estimates of wages and salaries and the corresponding proportion of supplements to wages and salaries. Average compensation was computed by dividing total compensation by the corresponding estimates of full-time equivalent employees. This average was extrapolated to 1902 by essentially the same method as that described by Fabricant.<sup>21</sup> From 1929 to 1919, the quotient of the Kuznets payroll and employment estimates was used;<sup>22</sup> from 1919 to 1909, estimates by King were available;<sup>23</sup> and from 1909 to 1903, we employed the Douglas estimates of the average annual earnings of government employees in the District of Columbia.<sup>24</sup> The 1903 estimate was extrapolated to 1869 by the average salary per teacher in primary and secondary schools,<sup>25</sup> converted to a calendar-year basis. Total compensation was then computed as the product of employment and average compensation.

While the average compensation series prior to 1909 are substitute estimates, it is not unreasonable to assume that salaries of public school teachers and other public employees tended to move together. External evidence bearing on the reasonableness of the resulting payroll figures is provided by the fact that "other" state and local purchases, which are computed as a residual by deducting payrolls and construction outlays from an independent total for 1890, 1902, and subsequent years to 1939, show an extremely regular trend when deflated by prices and population.

Total compensation of public school employees in 1929 is the Commerce estimate, after splitting supplements between school and nonschool employees in proportion to their wages and salaries. Total compensation was extrapolated to 1909 by the Kuznets and King estimates of school payrolls, which are consistent with their employment estimates which we used to extrapolate our school employment series. From 1910 back, the estimates of salaries of teachers, supervisors, and principals were raised

<sup>21</sup> Fabricant, *op. cit.*, Appendix D.

<sup>22</sup> Kuznets, *National Income*, Tables G-2 and G-7.

<sup>23</sup> Willford I. King, *The National Income and Its Purchasing Power*, New York (NBER), 1930, Tables CXXII and CXXIII.

<sup>24</sup> Douglas, *op. cit.*, p. 392.

<sup>25</sup> *Statistical Abstract*, 1922, p. 103.

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by the ratio of our estimates of public school employment to the employment estimates consistent with the salary estimates. The upward adjustment amounted to 4.6 per cent in 1869 and 7.9 per cent in 1909. We thereby assume that the average earnings of teachers in higher educational institutions and "other" public schools move with those of teachers in public primary and secondary schools. The estimates from 1910 back were converted to a calendar-year basis by the same weighting procedures used to convert the employment estimates and were then linked to the school compensation series for the later years by the 1909 ratio.

*Average hours and manhours worked.* In the nonschool area of general government on a state and local level, there is no central source of information on average hours worked by public employees such as the Civil Service Commission provides for federal workers. Administrative units are so numerous that a comprehensive survey would be out of the question, even if historical records were available. Because the various government units are in a competitive position vis-à-vis private industry for the employment of most types of worker, it seems likely that, broadly speaking, the trend of average hours worked per year by state and local government nonschool employees would have paralleled the trend of average hours in the private economy generally. This proposition is broadly supported by some figures for several scattered dates. According to the Census Bureau estimates based on the sample surveys underlying the *Monthly Report on the Labor Force*, in 1955 average hours worked per week in public administration (excluding education) were 41.7, compared with an average for all industry of 41.8. On the basis of the 1940 *Census of Population*, Volume 3, Part 1, it can be calculated that government employees worked an average of 44.3 hours in the week of March 24-30, compared with an average for all industry of 43.3. In 1920, according to King,<sup>26</sup> public (and professional) employees worked an average of 48.9 hours a week compared with an average of 49.9 for all industries. It is true that the public administration figures cited include federal as well as state and local employees; but even after allowance for this, the parallelism of trend is quite evident. Accordingly, we have multiplied full-time equivalent employment in state and local governments (nonschool) by our estimates of average hours worked per full-time equivalent employee in the total private economy in order to approximate manhours worked in the former sector.

In the public school segment, we assume that average hours worked per day by the average teacher have not changed significantly over the period. In 1940, the average was 7.75 hours, obtained by dividing the average hours per week given in the 1940 *Census of Population* by 5. This figure

<sup>26</sup> Willford I. King, *Employment, Hours and Earnings in Prosperity and Depression, United States, 1920-22*, New York (NBER), 1923.

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allows for total time at school, not just classroom time. We then multiplied this figure by estimates of the average number of school days in each year.<sup>27</sup> The resulting estimate of average hours worked per year was then multiplied by annual estimates of the average number of full-time equivalent teachers.

It will be noted that due to the gradual increase in the number of days worked per year by public school teachers, there has been a corresponding increase in average hours worked per year in teaching. The effect of this on the economy would presumably be counterbalanced by a decline in the hours worked in other industries by persons whose primary occupation was in public education.

State and local work relief employment was treated in the same manner as federal work relief, described above.

TABLE K-I  
General-Government Employment, by Type, 1869-1953  
(thousands)

	<i>Total</i>	<i>Federal</i>		<i>State and Local</i>	
		<i>Civilian</i>	<i>Military</i>	<i>Nonschool</i>	<i>School</i>
1869-78*	458	20	41	142	255
1879-88*	618	40	37	208	333
1889	725	50	39	255	381
1890	739	52	37	262	388
1891	754	54	36	270	394
1892	774	56	37	279	402
1893	795	57	38	289	411
1894	819	59	41	299	420
1895	837	60	41	308	428
1896	849	62	40	315	432
1897	866	64	41	323	438
1898	1,028	71	183	331	443
1899	993	83	120	340	450
1900	1,023	88	123	352	460
1901	1,055	94	116	375	470
1902	1,071	96	103	392	480
1903	1,096	93	103	411	489
1904	1,130	99	107	429	495
1905	1,167	115	105	445	502
1906	1,213	128	109	464	512
1907	1,265	139	106	492	528
1908	1,333	144	125	521	543
1909	1,396	154	138	546	558

(continued)

<sup>27</sup> *Biennial Survey of Education*, various volumes.

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TABLE K-I (concluded)

	<i>Total</i>	<i>Federal</i>		<i>State and Local</i>	
		<i>Civilian</i>	<i>Military</i>	<i>Nonschool</i>	<i>School</i>
1910	1,453	165	135	578	575
1911	1,506	170	141	604	591
1912	1,565	171	149	635	610
1913	1,611	168	151	665	627
1914	1,688	174	161	702	651
1915	1,753	168	169	740	676
1916	1,794	176	174	746	698
1917	2,527	206	835	758	728
1918	5,060	564	2,968	769	759
1919	3,323	509	1,266	769	779
1920	2,314	380	353	774	807
1921	2,302	286	355	811	850
1922	2,264	258	266	854	886
1923	2,297	244	245	898	910
1924	2,399	240	261	960	938
1925	2,492	244	255	1,017	976
1926	2,553	237	251	1,053	1,012
1927	2,642	233	254	1,121	1,034
1928	2,695	240	256	1,146	1,053
1929 <sup>b</sup>	2,775	267	261	1,165	1,082
1937	5,056	2,144 <sup>c</sup>	313	1,434 <sup>c</sup>	1,165
1948	6,073	1,396	1,468	1,791	1,418
1953	9,139	1,783	3,545	2,079	1,732

<sup>a</sup> Annual average for decade.

<sup>b</sup> Total manhours worked in key years are given in Table A-XI. The 1929 breakdown is as follows (in millions): federal civilian, 525; military, 513; state and local nonschool, 2,918; school, 1,441.

<sup>c</sup> Including work relief employment of 1,627,000 in federal and 33,000 in state totals.