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Gallman's Annual Product Series, 1834–1909

5.1. Introduction

Gallman's annual series on the US gross national product over the 1834–1909 period represent one of the underground classics of American economic history. Building on over a decade of labor, he assembled his national product estimates in the mid-1960s to provide a clearer picture of long-run performance of the US economy. They offer a valuable additional perspective on the rate of capital formation, and how it changed over the nineteenth century. The data were originally published as overlapping decade averages in Gallman (1966), and the data became known as his volume 30 annual series. Over the next three decades, Gallman continued to refine and elaborate his value added and final flow estimates.

Gallman never published his annual data, in part because he worried that they would be used to analyze business cycle fluctuations and compare their changes over time. These were purposes for which the series were not designed. He always emphasized that (1) the series contained major derived components that did not move at business cycle frequencies, and (2) the methods of data construction before and after the Civil War differed in fundamental ways. A large part of the apparent differences in annual income dynamics between the antebellum and postbellum periods reflected differences in the estimation techniques, most particularly with respect to the residential service flows. Gallman's volume 30 annual series simply were not suitable for business cycle analysis, as tempting as

Rhode wrote this chapter.

that was. In the best scholarly tradition, Gallman did make his numbers available through the avenue of personal correspondence, with the appropriate caveats, to other economists and economic historians “for testing purposes.”

This chapter presents his two major annual series for US GNP calculated on the final flow (i.e., spending) side for the long nineteenth century: (1) US national product (excluding inventory changes) and the main sub-components in 1860 prices over the 1834–59 and 1869–1909 periods, and (2) national product in current prices over the 1869–1909 period.¹ It goes beyond the spreadsheets that have circulated since the mid-1960s by incorporating Gallman's work on inventory changes and discussing whether their inclusion is justified.

Gallman's numbers are about the best we have for the nineteenth century, and they provide important material for any attempt to create better national product estimates. In his modest way, Gallman gave a sense of their value in his 1996–97 “Notes for the File on National Accounts”:

The annual series underlying Volume 30 have several virtues . . . It has been extended into the ante-bellum years—on an annual basis, to 1834, and on an intermittent basis, to 1800—and it links with twentieth century series, rendering a quantitative account of virtually the entire national history of the United States; in most of the period with which we are principally concerned, it is available in considerable detail, distinguishing the various forms of consumption and of capital formation; [and] it lies within a consistent scheme of national accounting, which includes both the sectoral values added series . . . and the capital stock estimates. . . .²

Indeed, the volume 30 annual series were the product decades of painstaking labor and careful judgment by one of the best economic historians. One way to prevent the abuse of these series is greater openness, publicizing their limitations as indicators of the business cycle while highlighting their value for other scholarly endeavors.

In this chapter, the section 5.2 introduces Gallman's annual series and documents why these figures, among those in Gallman's files, are his most “finished” product. It also uncovers and corrects a small number of errors appearing in the circulated spreadsheets. Sections 5.3 and 5.4 discuss Gallman's efforts to construct and further develop the volume 30 annual series. Section 5.5 lays out the limitations on their usefulness for business-cycle analysis. Section 5.6 compares the volume 30 annual series to other

available pre-1909 series for GNP and the implicit price deflator. Major findings from the series and the components are explored in section 5.7. Section 5.8 discusses Gallman's extensions and section 5.9 concludes

5.2. The Volume 30 Annual Series

Tables 5.1 and 5.2 show Gallman's annual series in constant 1860 prices for national product and its major spending subcomponents over the 1834–59 and 1869–1909 periods, respectively. The 1834–59 series are for census years—that is, 1839 refers to 1 June 1839 to 31 May 1840—and those for 1869–1909 are for calendar years.³ Table 5.2 also includes Gallman's newer (1990s) estimates of annual changes in inventories for the 1870–1909 period, and reports on various corrections to the postbellum real income series. Table 5.3 displays Gallman's series on annual national product and its major spending subcomponents over the 1869–1909 period in current prices. Gallman did not develop annual current-value national product series for the antebellum period in volume 30 because the relevant price deflators were available only intermittently.⁴ Because Gallman made a number of revisions over time, the series reported in this chapter differ somewhat from those underlying the published decadal averages. Gallman's practice remained to refer to these numbers as the “volume 30 series.”

The data in table 5.1 are, with Gallman's minor revisions, fundamentally the same as those underlying the overlapping decennial series published in Gallman (1966). The differences resulted from (1) small discrepancies in rounding and (2) small revisions to the estimates for manufactured producers' durables in the postbellum period, especially for the 1884–1903 period.⁵

Apart from the inventory investment estimates, the figures using the 1860 prices are from a typeset mimeograph found in Gallman's files dated June 1965, with “Master-Final Version” penciled in his hand.⁶ We have several solid pieces of evidence that Gallman considered these series his most “finished.” First, he was using these spreadsheets as the basis for his work on national product and capital formation in the 1980s and 1990s. One copy has a pencil note: “Checked—May 24, 1993.” Second, he apparently sent the 1860-price national product series for 1834–59 from the June 1965 sheets to Robert Margo as late as 7 February 1996.⁷ Third, Gallman sent the 1834–1909 national product series to Benjamin Friedman as late as 15 August 1995.⁸

There seems little doubt that Gallman intended to revise the annual series underlying volume 30 to include the newer inventory investment estimates. In the document "Notes for the File on National Accounts," he states, "The annual series underlying Volume 30 . . . has an important, but easily eliminated, shortcoming: it does not include changes in the value of inventories. New estimates have now been made, however, removing this shortcoming."⁹ Indeed, Gallman (2000, 6–8) incorporated the inventory changes. Moreover, he included his later estimates of annual inventory changes in the series sent to Friedman.

The current price series for the 1869–1909 period are from handwritten spreadsheets dated June 1967, found in Gallman's files.¹⁰ Again, there is evidence that he used these sheets as the basis for his subsequent work.

Gallman at various times reported statistics based on net national product (NNP) over decade-long periods. Recall that NNP equals GNP minus capital consumption. Gallman does not appear to have estimated NNP annually for his constant price series.¹¹ Instead, he appears to have generated capital consumption estimates from the capital stock estimates available every ten years. Gallman (2000, 25) describes estimating capital consumption from the variant B capital stock figures using straight-line depreciation techniques, assuming that the lifespan of structures is fifty years and of equipment is fifteen years, and that the average age of structures is ten years and of equipment is five years. He refers to the results as approximate. Gallman (1992, 100) asserted that the investments in land improvement do not depreciate.

Gallman's efforts to construct and improve his national product estimates spanned more than five decades. The paper trail he left, while not complete, is amazingly thick. There are feet upon feet of files, containing drafts of articles and huge paper accounting spreadsheets filled with handwritten entries, calculations, and source notes. Many of the exercises are repeated *ad infinitum*, with numbers transferred by hand from one sheet to the next. Gallman and his research assistants were usually very thorough in outlining the steps used to produce a given number on a given sheet, but less helpful in bridging between the sheets or dating the calculations. And because the numbers created or used in one branch of his work built on and required modifications to numbers created or used in other branches, the records are not always in chronological order. There are several instances where gaps appear in the paper trail.¹² Research leaves, changes in research assistants, and movements between offices no doubt

TABLE 5.1 **Gallman's annual national product series, measured in 1860 prices, 1834–59, in millions of dollars**

Value of goods flowing to consumers						
Census year	Perishable goods	Semidurable goods	Durable goods	Total goods	Services	Total consumption
1834	753.6	124.8	25.5	903.9	419	1,322.9
1835	703.3	148.5	30.7	882.5	426	1,308.5
1836	688.7	113.9	28.8	831.4	432	1,263.4
1837	754.6	99.9	34.4	888.9	440	1,328.9
1838	718.5	150.9	36.7	906.1	449	1,355.1
1839	826.3	107.8	31.1	965.2	457	1,422.2
1840	832.7	125.3	29.0	987.0	465	1,452
1841	859.5	140.6	36.2	1,036.3	474	1,510.3
1842	894.1	89.0	40.0	1,023.1	484	1,507.1
1843	1,044.6	146.7	41.8	1,233.1	493	1,726.1
1844	1,008.7	217.4	51.9	1,278.0	502	1,780.0
1845	1,057.7	209.4	60.2	1,327.3	514	1,841.3
1846	1,022.1	218.8	68.4	1,309.3	531	1,840.3
1847	1,133.2	302.6	82.9	1,518.7	550	2,068.7
1848	1,144.7	298.2	90.3	1,533.2	570	2,103.2
1849	1,145.4	334.9	96.6	1,576.9	594	2,170.9
1850	1,178.0	402.1	108.5	1,688.6	616	2,304.6
1851	1,270.5	401.4	127.8	1,799.7	647	2,446.7
1852	1,409.2	498.1	156.6	2,063.9	682	2,745.9
1853	1,513.1	598.6	162	2,273.7	721	2,994.7
1854	1,457.0	445.9	162.3	2,065.2	758	2,823.2
1855	1,551.7	555.2	177	2,283.9	790	3,073.9
1856	1,496.1	565.5	187	2,248.6	828	3,076.6
1857	1,617.1	433.3	184.2	2,234.6	863	3,097.6
1858	1,824.5	567.4	197.5	2,589.4	892	3,481.4
1859	1,825.9	622.5	200.4	2,648.8	919	3,567.8

N.B. When citing these series, include the following statement: "These series were not constructed for analysis as annual series."

Sources: Gallman Papers

explain some of these gaps. Though one cannot exactly replicate the series from the background material available, one can usually come close, and the published documentation of the sources and procedures employed is remarkably good.

As noted above, there are a handful of errors in Gallman's original data underlying tables 5.2 and 5.3. The most notable errors occur in the data on gross investment in new railroad construction in 1860 prices for the 1875–77 period. The supporting documents suggest that the problem

Capital formation, less change in inventories							Correction		
Manuf. producers' durables	Gross new construction				Changes in claims against foreigners	Total capital formation	(excluding inventory changes)	For Pennsylvania mainline	
	Railroad	Canal	Other	Total				Canal	GNP
32.0	9.3	5.5	66.7	81.5	-33.5	80.0	1,402.9	3.9	1,401
33.7	11.2	5.1	80.9	97.2	-61.7	69.2	1,377.7	4.7	1,377
31.7	13.9	7.5	75.1	96.5	-20.9	107.3	1,370.7	7.4	1,370
33.3	16.1	12.3	101.4	129.8	-5.0	158.1	1,487	11.9	1,487
33.9	16.9	15.6	118.2	150.7	-46.9	137.7	1,492.8	15.1	1,492
27.1	15.1	16.9	108.1	140.1	33.2	200.4	1,622.6	16.6	1,622
25.5	12.6	16.3	111.0	139.9	-8.3	157.1	1,609.1	16.1	1,609
31.2	10.0	9.5	111.0	130.5	7.0	168.7	1,679.0	9.5	1,679
32.4	6.5	2.7	104.3	113.5	26.8	172.7	1,679.8	2.7	1,680
34.2	5.8	1.3	107.1	114.2	5.7	154.1	1,880.2	1.2	1,880
44.4	7.2	1.9	136.4	145.5	4.2	194.1	1,974.1	1.8	1,974
51.0	10.1	2.4	164.0	176.5	0.9	228.4	2,069.7	2.4	2,069
59.9	16.9	4.2	187.4	208.5	27.0	295.4	2,135.7		
75.5	27.2	5.8	184.5	217.5	5.8	298.8	2,367.5		
68.6	33.4	4.8	177.1	215.3	8.8	292.7	2,395.9		
66.5	35.1	5.0	177.3	217.4	-25.7	258.2	2,429.1		
75.7	41.9	5.7	211.7	259.3	-4.4	330.6	2,635.2		
86.9	55.3	4.7	252	312	-14.1	384.8	2,831.5		
102.6	72.3	4.1	292.2	368.6	-57.9	413.3	3,159.2		
112.3	86.8	4.7	326.4	417.9	-34.2	496	3,490.7		
124.1	78.1	5.5	346.9	430.5	-12.2	542.4	3,365.6		
143.1	61.4	5.1	375.4	441.9	-10.0	575.0	3,648.9		
154.7	62.3	4.1	414	480.4	-14.8	620.3	3,696.9		
138.3	62.7	3.4	394.5	460.6	21.5	620.4	3,718.0		
124.1	54.4	2.5	346.1	403	-25.7	501.4	3,982.8		
133.1	44.3	1.6	345.9	391.8	7.2	532.1	4,099.9		

arose because a research assistant misplaced the decimal point when deflating the current dollar investment series by the construction cost index.¹³ There were several typos and inconsistencies in Gallman's inventory investment series.¹⁴ Given that the original data are used in much of Gallman's later work, it seems desirable to present them without revision and to include my suggested corrections separately (in the bottom rows and far right columns of the tables). The corrections, while important for the component series, have a negligible effect on the estimated total income; the differences in the resulting GNP estimates are always less than

TABLE 5.2 Gallman's annual national product series, measured in 1860 prices, 1869–1909, in millions of dollars

Value of goods flowing to consumers					Capital formation, less changes in inventories		
					Total consumption	Manufactured producers' durables	Gross new construction
Perishable goods	Semidurables	Durable goods	Total goods	Services			Railroad
2,166	669	349	3,184	1,009	4,193	360	158
2,103	734	330	3,167	958	4,125	375	233
2,095	831	325	3,251	975	4,226	375	196
2,449	876	425	3,750	1,059	4,809	537	189
2,577	810	442	3,829	1,112	4,941	564	125
2,697	806	389	3,892	1,195	5,087	431	47
2,595	894	450	3,939	1,254	5,193	384	<u>282</u>
2,772	921	447	4,140	1,373	5,513	427	<u>292</u>
2,991	1,020	486	4,497	1,449	5,946	441	<u>338</u>
3,187	1,023	474	4,684	1,481	6,165	517	75
3,456	1,170	550	5,176	1,638	6,814	583	69
3,958	1,385	595	5,938	1,791	7,729	869	149
3,891	1,304	673	5,868	1,741	7,609	1,052	230
4,204	1,429	737	6,370	1,846	8,216	1,166	184
4,240	1,420	752	6,412	1,832	8,244	1,108	117
4,497	1,368	758	6,623	1,851	8,474	889	97
4,470	1,524	867	6,861	1,866	8,727	845	75
4,421	1,575	998	6,994	1,857	8,851	1,254	92
4,505	1,567	1,077	7,149	1,854	9,003	1,555	119
4,494	1,597	1,092	7,183	1,836	9,019	1,448	103
4,686	1,665	1,088	7,439	1,837	9,276	1,571	96
4,492	1,763	1,162	7,417	1,820	9,237	1,643	102
4,921	1,800	1,183	7,904	1,918	9,822	1,813	118
4,904	1,886	1,253	8,043	1,979	10,022	1,928	255
5,381	1,723	1,114	8,218	1,978	10,196	1,895	267
5,248	1,671	988	7,907	1,925	9,832	1,474	106
5,626	1,973	1,206	8,805	2,145	10,950	1,844	11
5,608	1,913	1,187	8,708	2,154	10,862	2,162	0
5,998	2,058	1,270	9,326	2,306	11,632	1,758	0
6,137	2,044	1,230	9,411	2,348	11,759	1,832	0
6,727	2,290	1,403	10,420	2,602	13,022	2,297	41
6,762	2,301	1,335	10,398	2,682	13,080	2,696	48
7,586	2,549	1,429	11,564	3,008	14,572	2,793	38
7,337	2,643	1,523	11,503	3,087	14,590	3,190	26
7,783	2,774	1,546	12,103	3,296	15,399	3,626	13
7,791	2,801	1,521	12,113	3,394	15,507	3,083	54
8,013	2,941	1,734	12,688	3,625	16,313	3,637	66
8,910	3,172	1,968	14,050	4,016	18,066	4,559	93
9,155	3,128	1,886	14,169	4,165	18,334	4,810	112
8,265	3,137	1,633	13,035	4,057	17,092	3,328	225
9,046	3,427	2,043	14,516	4,429	18,945	3,778	248
As corrected							28
							29
							34

N.B. When citing these series, include the following statement: "These series were not constructed for analysis as annual series." Notes: Examination of the underlying spreadsheets converting current-value railroad investment estimates into constant-value estimates reveals that a decimal-place error occurs in the original calculations for 1875–77. The affected series are indicated by underlining. The corrected series adjusted railroad construction, total construction, total capital formation, and GNP. The Gallman revised railroad construction estimates can be used to replace this original series. The revised inventory series differs by rounding and errors in the underlying data. Sources: Gallman papers

				GNP	Inventory changes	GNP	Railroad construction

TABLE 5.3. Gallman's annual national product series, measured in current prices, 1869–1909, in millions of dollars

Value of goods flowing to consumers						
Calendar year	Perishable goods	Semidurables	Durable goods	Total goods	Services	Total consumption
1869	3,319	940	401	4,660	1,499	6,159
1870	3,036	992	398	4,426	1,427	5,853
1871	3,029	1,090	417	4,536	1,466	6,002
1872	3,111	1,251	537	4,899	1,587	6,486
1873	3,321	1,126	506	4,953	1,608	6,561
1874	3,570	1,063	459	5,092	1,656	6,748
1875	3,430	1,124	471	5,025	1,686	6,711
1876	3,495	1,053	440	4,988	1,753	6,741
1877	3,634	1,123	444	5,201	1,845	7,046
1878	3,486	1,047	418	4,951	1,884	6,835
1879	3,571	1,188	460	5,219	2,046	7,265
1880	4,543	1,623	606	6,772	2,310	9,082
1881	4,519	1,472	611	6,602	2,280	8,882
1882	5,112	1,604	661	7,377	2,425	9,802
1883	5,079	1,543	656	7,278	2,422	9,700
1884	4,956	1,403	638	6,997	2,456	9,453
1885	4,352	1,504	659	6,515	2,484	8,999
1886	4,171	1,569	726	6,466	2,495	8,961
1887	4,406	1,567	745	6,718	2,531	9,249
1888	4,501	1,606	747	6,854	2,541	9,395
1889	4,737	1,666	765	7,168	2,598	9,766
1890	4,450	1,764	827	7,041	2,576	9,617
1891	4,854	1,771	855	7,480	2,710	10,190
1892	4,594	1,864	890	7,348	2,717	10,065
1893	5,404	1,674	763	7,841	2,795	10,636
1894	4,792	1,451	661	6,904	2,718	9,622
1895	5,068	1,671	767	7,506	3,003	10,509
1896	4,819	1,601	733	7,153	3,031	10,184
1897	5,255	1,741	782	7,778	3,264	11,042
1898	5,607	1,779	817	8,203	3,357	11,560
1899	6,247	2,086	981	9,314	3,780	13,094
1900	6,696	2,232	1,019	9,947	3,992	13,939
1901	7,491	2,333	1,111	10,935	4,533	15,468
1902	7,711	2,471	1,214	11,396	4,742	16,138
1903	8,089	2,664	1,275	12,028	5,154	17,182
1904	8,299	2,689	1,277	12,265	5,379	17,644
1905	8,657	2,974	1,474	13,105	5,819	18,924
1906	9,447	3,476	1,743	14,666	6,519	21,185
1907	10,262	3,588	1,817	15,667	6,875	22,542
1908	9,528	3,357	1,559	14,444	6,796	21,240
1909	10,927	3,823	1,370	16,120	7,540	23,660

N.B. When citing these series, include the following statement: “These series were not constructed for analysis as annual series.”

Notes: Revised inventory series corrects for typos and adjusts the livestock values over the 1869–79 period. The original series used *Historical Statistics* livestock prices, which are in gold dollars. The revised series uses prices in greenback dollars to maintain consistency.

Sources: Gallman papers, and annual reports of the US commissioner of agriculture, 1869–78.

Capital formation, less change in inventories					Inventory changes	
Manufactured producers' durables	Gross new construction	Changes in foreign claims	Total capital formation	GNP (excl. inventory changes)	Original	Revised
359	1,064	-187	1,236	7,395		
334	1,103	-149	1,288	7,141	232	-45
322	1,003	-192	1,133	7,135	186	-150
520	1,409	-252	1,677	8,163	269	432
566	1,314	-108	1,772	8,333	52	39
404	1,028	-107	1,325	8,073	-180	-147
354	1,004	-105	1,253	7,964	-117	-33
359	946	19	1,324	8,065	-164	-289
334	896	3	1,233	8,279	202	180
356	920	133	1,409	8,244	-150	-450
395	953	88	1,436	8,701	304	665
652	1,184	44	1,880	10,962	1,047	1067
699	1,603	24	2,326	11,208	285	109
758	1,584	-94	2,248	12,050	855	855
660	1,552	-28	2,184	11,884	219	218
457	1,658	-21	2,094	11,547	36	36
401	1,526	-43	1,884	10,883	197	-197
567	1,818	-88	2,297	11,258	129	129
682	1,932	-124	2,490	11,739	459	458
633	1,867	-155	2,345	11,740	333	335
657	1,830	-90	2,397	12,163	309	308
678	2,598	-115	3,161	12,778	191	191
682	2,314	-26	2,970	13,160	536	536
705	3,001	-53	3,653	13,718	-383	-383
677	2,490	-41	3,126	13,762	84	85
520	2,160	2	2,682	12,304	-1179	-1,179
590	2,091	-126	2,555	13,064	108	108
617	1,769	86	2,472	12,656	-86	-85
585	1,938	139	2,662	13,704	700	698
674	1,887	408	2,969	14,529	534	535
892	2,090	266	3,248	16,342	1,109	1,108
1,054	2,536	412	4,002	17,941	1,324	1,326
1,074	2,682	334	4,090	19,558	722	723
1,247	3,023	153	4,423	20,561	647	646
1,324	2,909	225	4,458	21,640	774	774
1,166	2,879	152	4,197	21,841	246	248
1,373	3,271	165	4,809	23,733	735	734
1,729	3,990	149	5,868	27,053	1,684	1,684
1,871	4,428	119	6,418	28,960	1,340	1,341
1,253	4,062	235	5,550	26,790	-1,114	-1,116
1,498	4,467	-161	5,804	29,464	1,744	1,743

TABLE 5.4 Shares of consumption, measured in 1860 prices

Percent	Perishable goods	Semidurables	Durable goods	Total goods	Services	Total consumption
1869–78	51.1	17.2	8.2	76.4	23.6	100
1874–83	51.1	17.0	8.3	76.4	23.6	100
1879–88	51.0	17.3	9.7	78.0	22.0	100
1884–93	50.5	17.8	11.4	79.7	20.3	100
1889–98	51.1	17.9	11.3	80.3	19.7	100
1894–1903	51.6	17.6	10.5	79.8	20.2	100
1899–1908	50.3	17.8	10.2	78.4	21.6	100

Source: See text.

3.5 percent. All of the subsequent discussion in this chapter will be based on Gallman's original annual series.

The estimates for consumption did not change. Table 5.4 uses the data from table 5.2 to calculate, at a three-digit level, the shares of key components—perishables, semiperishables, durables, and services—of consumption for overlapping decadal periods from 1869 to 1908. The shares are based on the constant (1860) price series. The numbers, adjusted for precision, exactly match those published in Gallman (2000).

5.3. Construction of the Volume 30 Annual Series

Gallman produced his estimates for the 1834–59 and 1869–1909 periods using the same basic methodological framework, but those for the antebellum period required substantially more original work. Construction of the series generally involved establishing solid benchmarks every five or ten years and then using a less comprehensive set of annual time series to interpolate values for the intervening years.

For the postbellum period, Gallman largely adjusted estimates made by Simon Kuznets (1946), who in turn had built up his estimates from the work of William H. Shaw (1947).¹⁵ Gallman made the following adjustments to the Kuznets series: (1) substituting new estimates for firewood, animal products, and federal excise taxes for Shaw's series (thereby substantially raising estimated income in 1869 and lowering growth rates over the 1870s and 1880s relative to Kuznets series); (2) incorporating new estimates of distribution costs based on Harold Barger (1955); (3) splitting

off railroad construction from other building activity and creating a more appropriate markup series; and (4) deflating the current-value GNP series by final price indexes (using an 1860 base) from Dorothy Brady (1966).¹⁶

Gallman constructed his antebellum national product series by (1) taking his benchmark figures for commodity (agriculture, mining, and manufacturing) production for the years 1834, 1836, 1839, 1844, 1849, 1854, and 1859; (2) adding estimates for the value of services based largely on capital stock series;¹⁷ and (3) interpolating the series in the intervening years using scattered annual data on numerous economic activities. The appendix of volume 30 extensively documents the procedures employed. The “major” benchmarks (1839, 1849, and 1859) were primarily based on materials from the US Census, whereas the “minor” benchmarks (1834, 1836, 1844, and 1854) used several state censuses. The benchmarks for commodity production relied primarily on the sectoral value-added data described in Gallman (1960). There were only small adjustments and shifts of commodity production between categories.

Two points deserve our attention here. The first is that these series incorporated the most up-to-date data available in the early 1960s. Gallman (1966) thanked Albert Fishlow, who generously provided his unpublished statistics on the annual production of locomotives and estimates of investments in railroad construction; Paul David, for his unpublished series on agricultural implement production; Robert Fogel, for his iron output series; Maurice Gottlieb, for figures on residential construction; and Dorothy Brady, for her final price series. These are not the final word. Gallman would have heartily applauded serious research to collect and analyze real data, such as Davis 2004, for the nineteenth-century US economy.

Second, the annual national product series between the benchmark years are interpolated or extrapolated using a less comprehensive set of products. The main issue is not the number of series used—for his antebellum estimates, Gallman (1966, 65–70) employed data on more than thirty commodities drawn from an amazing array of primary and secondary sources—but how representative their movements are. Regarding his use of interpolators and extrapolators, Gallman (1966, 64–71) noted that the statistics on net imports “receive relatively too much weight,” that industrial equipment is “inadequately represented,” that many of the major groups rely on one or a few underlying series, and that the flow of materials into production (e.g., wheat, corn, raw cotton and wool, and lumber) tended to dominate the series. He adds that lest these warnings “raise too many doubts, [one should] bear in mind that the interpolations

and extrapolations generally carry over only four years, and frequently fewer years than this. The estimates produced are only used in decade averages . . . to reduce our dependence on benchmark year estimates to establish prewar levels of performance.”

The main point is that these interpolation and extrapolation procedures are useful for determining long-run trends but, as Gallman noted, problematic for analyzing business-cycle fluctuations.¹⁸ This is especially true for investigations of the changing volatility of the macro-economy, or for comparison of one specific cycle with another. This message carries double weight for analyses contrasting the behavior of the antebellum and postbellum series, which at the detailed level are constructed in fundamentally different ways. One key difference is in how noncommodity production is estimated. As Gallman was keenly aware, the results of business-cycle analysis on the annual volume 30 data would depend more on artifact than on fact.¹⁹

5.4. Gallman’s Subsequent Work Related to the Volume 30 Annual Series

From the mid-1960s on, Gallman produced a long stream of articles—often in collaboration with Lance Davis, Edward Howle, or Thomas Weiss—that further developed and analyzed the volume 30 national product estimates (see table 1.1). Gallman (1965) added estimates of annual changes in inventories (based on decadal averages of differences in the capital stocks as estimated in his work with Howle). He generally judged data on inventory investments to be “relatively weak,” even “hazardous” (Davis and Gallman 1974, 439–40, 455). Gallman and Howle (1971) explored the sectoral distribution of income in greater detail.

Davis and Gallman (1973) reported new estimates of capital consumption and net investment flows, although this development seems overshadowed by the article’s other important contributions.²⁰ Calculating these figures involved depreciating the annual investment flows of equipment and structures estimated in the volume 30 series. Gallman (1972) took the next logical step by generating estimates of net national product for every decade from 1840 on. Davis and Gallman (1978) used the net investment and net national product statistics to provide evidence on the timing and extent of the rise of capital formation. In each case, the article fundamentally was a work of economic analysis and interpretation, but there was

usually some “value added” to the income or investment concept under examination.

Davis and Gallman (1973) also began to incorporate the research of Gallman and Weiss (1969) on the service sector. In his summary appraisal of the volume 30 antebellum series, Gallman (1966, 62) had observed:

Of all the estimates, the poorest are those of the value of services flowing to consumers. We do not know what margin for error to assign to these figures. If they are in error, the chances are that they are too high. Services account for roughly one-quarter of GNP in the prewar years. Consequently, an error as large as 20 per cent in the service component would throw GNP off by only 5 per cent.

Around 1966, Gallman started to work with Thomas Weiss to create new estimates of noncommodity production. These efforts led to the decadal estimates of the value added of the service sector from 1839 to 1899 reported in Gallman and Weiss (1969), a chapter in volume 34 of the *Studies in Income and Wealth*. Given that the new series used data from a far more comprehensive collection of service activities, they regarded these estimates as “stronger” than those derived from the volume 30 statistics (Gallman and Weiss 1969, 290).

The volume 30 series for services was reported in volume 34 as variant 1. It was calculated as a residual of national product minus net income originating from agriculture (including firewood production), manufacturing, mining, and construction. In addition to services, it included fishing and forestry exclusive of firewood production. The new series built up from data on components of the service sector was labeled variant 2. Table 5.5 compares the two variants.

As Gallman had anticipated, the volume 30 current-price series for the service sector was 5 to 18 percent higher than the new series over the 1839–79 period, and about 10 percent lower over the 1889–99 period. Consequently, the growth rate of service output as revealed by the new series was faster than that shown in the old, especially over the late nineteenth century. The difference was meaningful, but modest in the big picture. The average rate of growth over the 1839–99 period was 4.13 percent per annum for old variant 1 series, and 4.36 percent per annum for new variant 2 series. Subsequent articles used the volume 34 service sector series to make adjustments to decade averages (as an example, Davis and Gallman 1974). But Gallman did not systematically incorporate the

TABLE 5.5. **Revised estimates of the service sector: Comparison of two estimates of output, measured in current prices**

	Variant 1, vol. 30, in billions of dollars	Variant 2, vol. 34, in billions of dollars	Ratio of variant 1 to variant 2	Share of variant 2 in GNP percentage
1839	0.68	0.65	1.05	39
1849	1.11	0.94	1.18	38
1859	2.01	1.75	1.15	41
1869	3.32	2.93	1.13	37
1879	4.34	3.87	1.12	42
1889	5.80	6.50	0.89	46
1899	8.14	8.91	0.91	47

Source: Gallman and Weiss 1969, 288–89, 291.

volume 34 revisions in his underlying annual estimates. The volume 30 series continue to form the core of our best estimates of US GNP, NNP, and capital formation in the nineteenth century.

5.5. Limitations on the Uses of the Estimates

During his long career, Gallman circulated his unpublished volume 30 annual series to other scholars, but he almost always included a warning. As a 1963 mimeographed document put it: “NOTE: These figures should not be regarded as reliable, annual estimates. They were derived for the purpose of computing decade averages and are supplied to interested technicians for testing, not for analysis as annual series.”²¹ While this warning was not included in the June 1965 mimeo that is the source for the data presented here, there is little doubt that his feelings had not changed substantially. Gallman’s background materials underlying chapter 3 (“Appendix US Estimates of National Product”) in Davis and Gallman (2001) reiterated these concerns. These drafts noted that neither Simon Kuznets nor John Kendrick published their annual GNP series: “Kuznets thought the series would be useful in the study of trends and long swings, but he had doubts with respect to their ability to properly describe business cycles. For this reason, he never published annual series for the years before 1889. These annual series were available in mimeographed form, however, and have been used by other scholars in their work on national product.” Gallman further wrote that the explanation for publishing the

volume 30 series “only in the form of decade average . . . was the same as Kuznets had used earlier.”²²

Because the research community abhors a vacuum as much as nature does, analyses of the annual volume 30 series did appear in print. Gallman did allow Milton Friedman and Anna Schwartz to publish a “some-what revised” version of his series over the 1869–1909 period. Essentially, Friedman and Schwartz (1982, 99–101, 122–26) created a net product series from Gallman’s volume 30 annual series by adding inventory changes back in, estimating and deducting depreciation, and shifting the price base to 1929. Gallman’s 1834–59 national product series were never published in annual form.

Gallman’s objective in creating his annual series was exactly the opposite of business-cycle analysis. He wanted to control for short-run fluctuations so that they would not cloud our assessment of longer-run economic performance. Simple comparisons of the benchmark estimates, available only on a five- or ten-year basis, risked comparing peaks with troughs. Table 5.6 provides a better sense of differences resulting from using the benchmark estimates and the decadal averages. As it shows, especially in the antebellum period, the growth rates calculated over the decadal averages are less volatile than those based on comparisons of the single-year benchmarks.²³

TABLE 5.6 Comparison of benchmark and decade average growth rates in Gallman’s 1860-price GNP series

	Value, measured in millions of 1860 dollars			Growth rates per annum over decade	
	Single year	Decade average	Ratio	Single years	Decade averages
1834	1,403	—	—	—	—
1839	1,623	1,560	1.04	2.91%	—
1844	1,974	1,941	1.02	3.92%	4.37%
1849	2,429	2,549	0.95	4.14%	5.45%
1854	3,366	3,296	1.02	6.52%	5.15%
1859	4,100	—	—	3.94%	—
1869	5,347	—	—	—	—
1879	8,336	8,417	0.99	4.44%	—
1889	12,426	12,604	0.99	3.99%	4.04%
1899	17,527	17,353	1.01	3.44%	3.20%
1909	25,800	—	—	3.87%	—

Notes: Decade averages are centered ten-year moving averages. That is, 1839 is the average from 1834 to 1843. Sources: Tables 5.1 and 5.2.

5.6. Comparisons with Other Estimates

To assess the volume 30 annual series more fully, it is useful to compare them with the other available annual series. One obvious set of comparisons for the antebellum period is Thomas Berry (1978, 1988). Berry constructed income estimates for the 1789–1889 period using regression analysis and back-projection. Berry found several long time-series of economic variables that were available during the period when reliable national product estimate existed, and which extend back into the earlier “statistical dark age.” Berry empirically estimated the relationship between these variables and the national product series during the period of overlap, and then used these coefficients to backcast the product series for the earlier period. This procedure is problematic if these relationships shift over time—that is, if, as almost every observer attests, the US economy experienced significant structural change over this period. Given that Gallman’s income estimates over the 1834–59 period are based on a firmer empirical foundation than Berry’s numbers, this comparison is best viewed as a test of Berry.

Figure 5.1 and 5.2 compares the annual constant-dollar product 1978 and 1988 estimates of Thomas Berry with those of Robert Gallman over the 1889–34 and 1834–59 periods respectively. For the early period, figure 5.1 includes income estimates from Gallman (2000, table 3) for 1793, 1800, 1807, 1810, 1820, and 1830 (which added estimates for inventory changes). For the later period, figure 5.2 compares the Gallman and Berry series directly.²⁴ For the 1834–59 period, Gallman’s series starts lower than either of the Berry’s series; it displays considerably more variability than the Berry 1978 series, but less than the Berry 1988 series. Also note that for the earlier 1789–1834 period, Berry’s figures are initially lower than Gallman’s, implying higher rates of growth.

Making comparisons for the postbellum period is more difficult because there are now numerous alternative series. Among the series pre-dating the volume 30 series are those of Kuznets and Kendrick. Kendrick’s main contribution was to adjust the concepts underlying Kuznets’s series to make the national product estimates more comparable to the official Department of Commerce series. Specifically, Kendrick treated the government sector differently. This adjustment resulted in unimportant changes over the late nineteenth century, because government spending was small. Figure 5.3 compares the real Kuznets variant I annual GNP

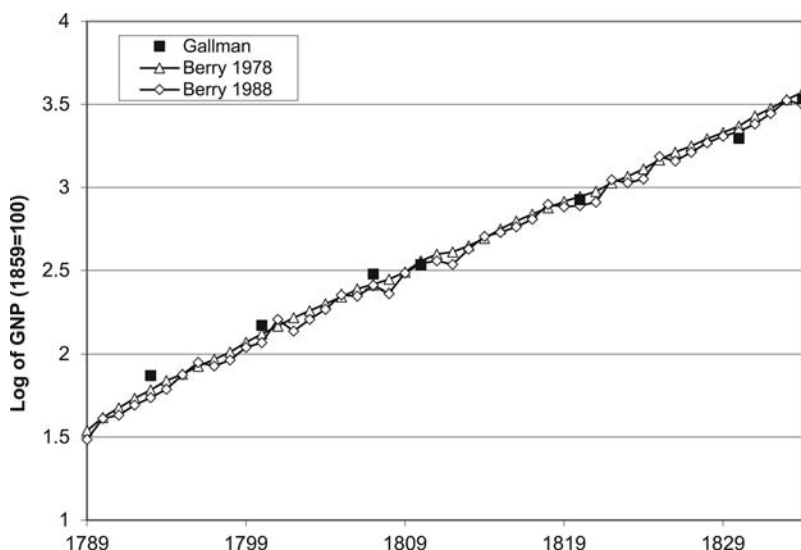


FIGURE 5.1 Comparison of antebellum GNP series, 1789-1834. Sources: See text.

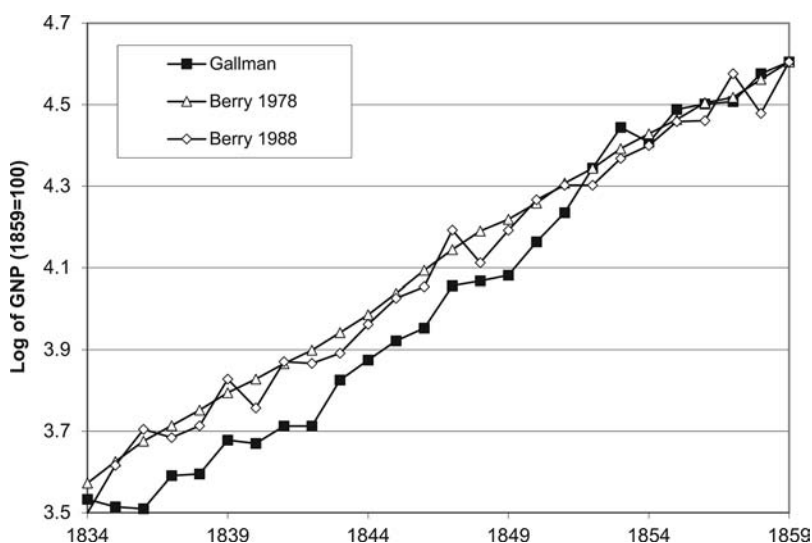


FIGURE 5.2 Comparison of antebellum GNP series, 1834-59. Sources: See text.

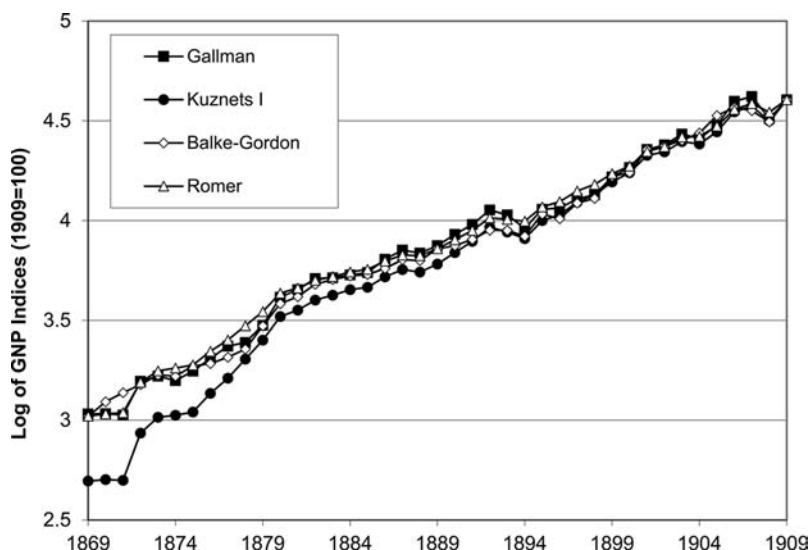


FIGURE 5.3 Comparison of postbellum GNP series, 1869–1909. Sources: See text.

series with Gallman's counterpart over the 1869–1909 period, using 1909 as the base date. (Note that Kuznets aggregated using 1929 prices whereas Gallman employed 1860 prices.) As the discussion in volume 30 indicated, the rate of growth implicit in the Kuznets series exceeded that in the Gallman series during the period after the Civil War.

Postdating the volume 30 series are those of Christina D. Romer (1989) and of Nathan S. Balke and Robert J. Gordon (1989). Both these series accepted the revisions that Gallman made to Kuznets's series, and made further changes which affected the cyclical movements of the series rather than its general trend. Romer used regression analysis to replace Kuznets's less formal procedure for establishing the relationship between commodity production and the output of the service sector. To estimate noncommodity production, Balke-Gordon also used regression analysis. In addition, they developed new interpolators for the construction, transportation, and communications sectors and constructed new annual deflators based on movements in consumer prices.

Comparing his series with the Romer and Balke-Gordon series, Gallman concluded that the three series "differ chiefly in the methods used to estimate noncommodity production, and the differences in methods chiefly affect undulations in the series, not trends." Figure 5.3 also includes

the Romer and Balke-Gordon constant-value GNP series. As Gallman observed, there were important differences in the annual movements of the series around 1894 and again in 1903/04, but over the long run the series tell roughly similar stories. He further argued that because only the volume 30 style series offered details regarding the composition of GNP, it retained substantial value.²⁵ Elsewhere, Gallman concluded that the three series exhibited “quite similar” decennial rates of change. The most visible discrepancies occurred in the 1870s, when the Balke-Gordon series displays a markedly different pattern from the Romer, Gallman, or Kuznets series. However, correcting the typos in Gallman’s railroad construction series in the 1875–77 period creates a series closer to that of Balke-Gordon during the second half of the 1870s.

Another important point of comparison between the various national product estimates for the nineteenth century is their implicit price deflators relating current-dollar to constant-dollar income. Figure 5.4 graphs the deflators (set at 100 in 1909) implicit in the Gallman, Kuznets variant I, Balke-Gordon, and Romer product estimates for the postbellum period.²⁶ The Gallman and Romer series follow roughly similar patterns. As Balke and Gordon (1898, 71–75) note, their deflator, which is based primarily on the consumer price indexes of Hoover and Rees, displays

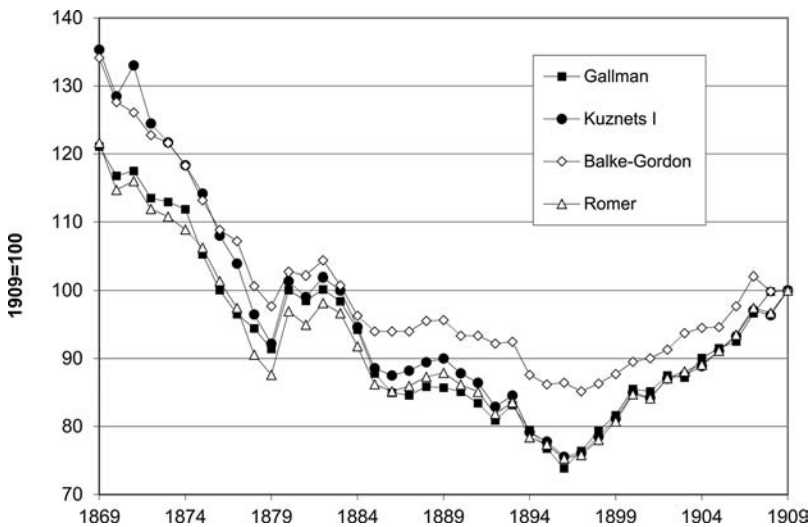


FIGURE 5.4 Implicit price deflators for postbellum income estimates. Source: See text.

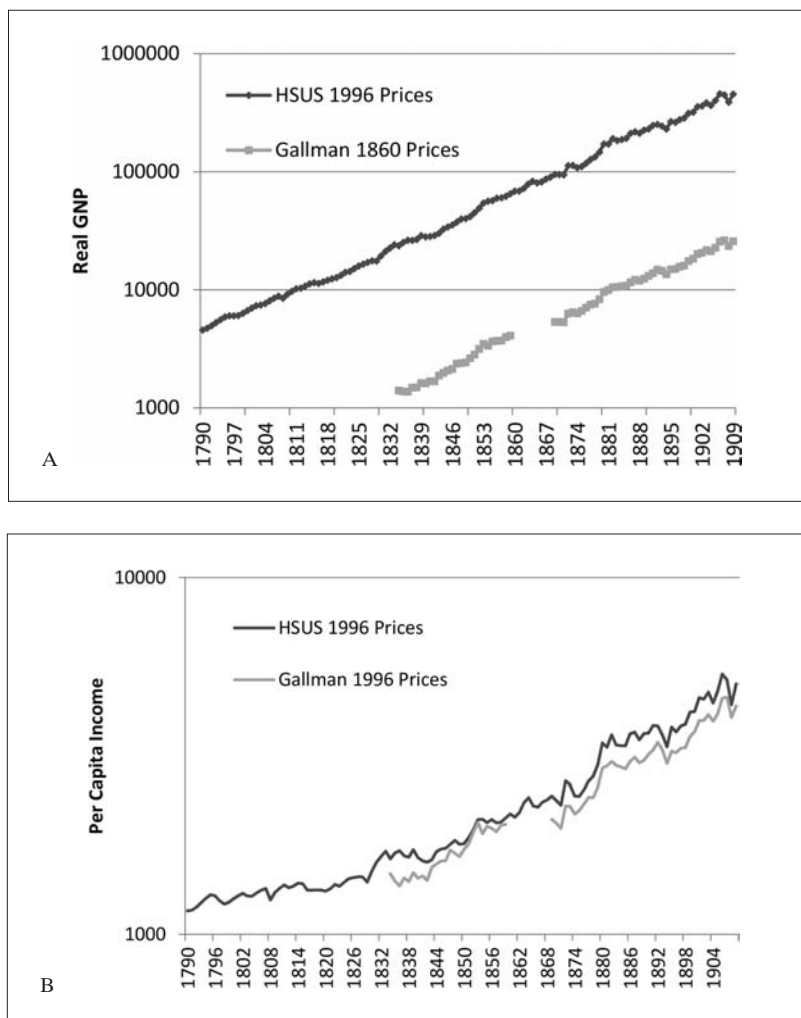


FIGURE 5.5 Comparison of Gallman and HSUS real GNP series: (a) total income; (b) per capita income in 1996 prices (1996 = 100, 1860 = 6.54). Sources: See text.

a consistently different picture. The Kuznets series initially tracks the Balke-Gordon series, but shifts to the Gallman-Romer pattern from the 1880s on. The year-to-year movements of all four series largely coincide.

Figure 5.5 compares Gallman's constant-price series with the series appearing in Carter et al. (2006), series Cag (hereafter, HSUS). To facilitate

the examination of the two series for total income, the Gallman series is left in 1860 prices, whereas the HSUS series is left in 1996 prices. For the two series on per capita income, the Gallman series is converted to 1996 = 100 prices (on the assumption that 1860 = 6.54). In making the comparisons, one must note that the construction of the HSUS series likely depends in part on the Gallman series. The two estimates are not independent.

5.7 Major Findings

Gallman's annual product series yields new insights about the changing importance of capital goods in US output flows over the nineteenth century. Figure 5.6 graphs the share of annual product by major categories: services, consumer perishables and semidurables, consumer durables, producer durables, railroad and canal construction, and other construction. Commodity production (everything except services) was generally on the rise, especially over the antebellum period. The commodity share rose from about two-thirds of output in 1834 to about four-fifths in the late 1880s, then plateaued and declined gradually. Production of capital goods generally rose from 1834 on. Internal improvements such as investments

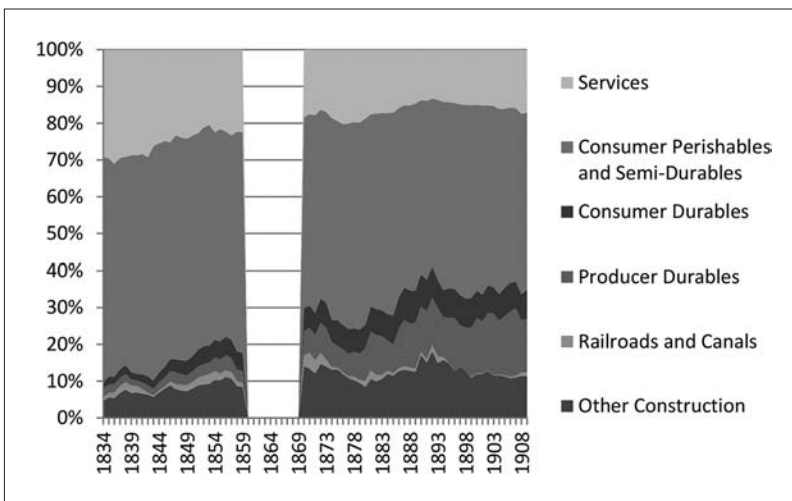


FIGURE 5.6 Composition of output, constant price series, 1834–1909. Source: See text.

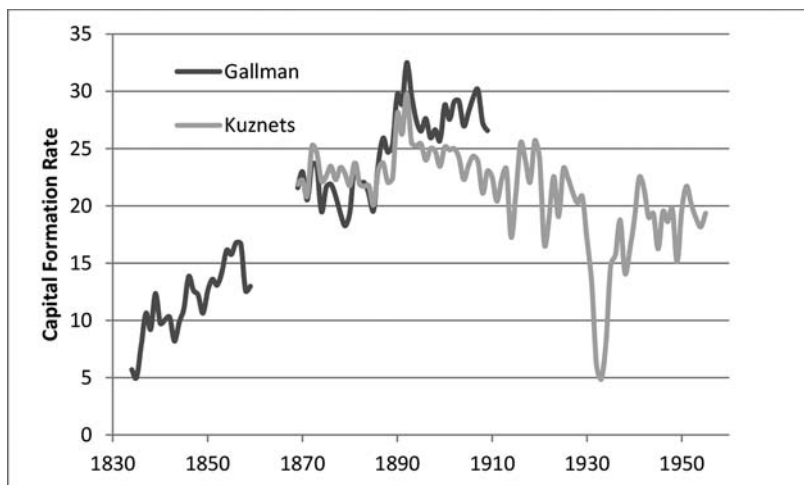


FIGURE 5.7 US capital formation rate, 1834–1955. Sources: constant price series from Gallman 1966 and text, and Kuznets 1961a and underlying T-tables.

in railroad and canals do not appear to drive this increase, except in the immediate post–Civil War period.

Figure 5.7 places Gallman's series on US capital formation rate for the 1834–1909 period into a longer context. The figure relates Gallman's series with those from 1869 to 1955 of Simon Kuznets, Gallman's mentor. In the capstone volume of his ambitious *Capital in the American Economy* project, Kuznets (1961a, 8–11) concluded that the share of gross capital formation in US gross national product measured in current prices was very stable—at about 20 percent—between the 1870s and the 1950s. This finding served as one of the foundations for Nicholas Kaldor's (1961) stylized macroeconomic constants. But Kuznets's fixed-price series (plotted in figure 5.7) revealed a different pattern: an uneven rise from 1869 to early 1890s and then a gradually declining trend. This trend was interrupted by fluctuations, such as the investment collapse in the Great Contraction, when the rate of capital formation fell to about 5 percent in 1933. The stability that Kuznets noted was predicated on the rebound of the rate to about 20 percent in the early post–World War II period.

Gallman (1966) numbers, which pushed the series back to 1834, completely undermined any picture of a constant rate of capital formation. According to Gallman's main series (displayed in figure 5.7), the share of

real gross capital formation in GNP rose from “roughly one-tenth in the late 1830s and early 1840s to about one-quarter” in the 1886–1900 period (Davis and Gallman 1973, 437). The capital formation rate grew by a factor of two or three. The largest change occurred during the 1860s, the Civil War decade.²⁷ Numerous scholars (Abramovitz and David 1973a, 1973b; Davis and Gallman 1973, 1978, 1994; Williamson 1974) have sought to explain these patterns.

5.8. Extensions

Gallman considered the annual estimates of nineteenth-century US national product that he made in the 1960s to be “incomplete.” He worked over the subsequent decades to make improvements. A memo from 20 May 1985 highlighted the following limitations with the volume 30 income series:

- (a) They are missing one element of investment—changes in inventories.
- (b) There is a gap in the series from 1859 to 1869.
- (c) The current price components of the series are intermittent before the Civil War.
- (d) The series do not extend back of 1834.
- (e) There are no net national product estimates.
- (f) Also, it would be helpful to complete estimates expressed in, say, 1929 prices to facilitate long-term analysis.²⁸

Gallman and his research assistants engaged in a project in the summer of 1985 to address several of these issues, specifically a, b, and c. With the exception of the estimation of inventory changes, these initiatives apparently did not reach such a finished stage as to merit incorporation in the annual series that Gallman sent to scholars in the 1990s.

Most of this work in the mid-1980s focused on adjustments relevant to Gallman's capital stock project. For example, to create estimates comparable to those of Raymond Goldsmith and to check his own census-based capital stock estimates, Gallman (1987) pursued the perpetual inventory approach of accumulating and depreciating annual investment flows. As part of this research, he produced and published a variety of new annual series on investment in manufactured producers' durables and construction. This endeavor required filling the gap in his annual product series

during the Civil War decade and projecting the series back from 1834 to 1790 (addressing points b and d above). For this purpose, Gallman relied on Berry's 1978 national product series, which explains in part his thoroughgoing analysis of this work. Gallman (1987, 217) concluded that the Berry series suffered from two weaknesses: (1) investment was derived as residual of product minus consumption, and (2) "the empirical bases for the Berry estimates become ever more fragile as the series extends into the early nineteenth century and the late eighteenth." This project produced several new investment series, but there is little or no evidence that Gallman believed that these should replace the figures in his volume 30 series. Indeed, regarding the perpetual inventory estimates, Gallman (1987, 254) wrote: "I publish the annual data with some misgiving—in view of the weaknesses of the evidence on which they are based—and refuse to warrant them for any particular purpose. Future users are on their own and are asked not to blame me if the series do not perform up to expectations. On the other hand, I am willing to accept the credit if they do."

Gallman also actively but intermittently worked to revise his transportation investment series. The original volume 30 estimates of the value of railroad construction relied on the work of Melville Ulmer (1960), which never truly satisfied Gallman. Gallman (1966, 37–38) reported using Ulmer's cost index with "some hesitancy." In the mid-1980s he set his research assistants on the task of recalculating antebellum canal and railroad investment. Part of the goal was to incorporate Fishlow's superior construction cost estimates. Another part was to correct problems in Cranmer's canal investment series, which, as Segal noted, included some of the Pennsylvania Mainline System's early investments in railroads. More generally, Gallman wanted to derive series on railroad construction consistent with his decadal railroad capital stock estimates. A notebook from the mid-1980s entitled "Measurement of U.S. Nineteenth Century National Product" concluded that these adjustments were "not of great quantitative significance."²⁹

Spurred on by communications with Richard Sutch in 1993 and 1994, Gallman revisited his attempts to revise capital formation estimates in American railroads over the late nineteenth century.³⁰ The nature of the problem in the volume 30 annual series is apparent in the constant-value railroad construction series appearing in table 5.2. In the process of disaggregating postbellum construction into railroad and nonrailroad components, Gallman used Ulmer's estimates of gross capital expenditures

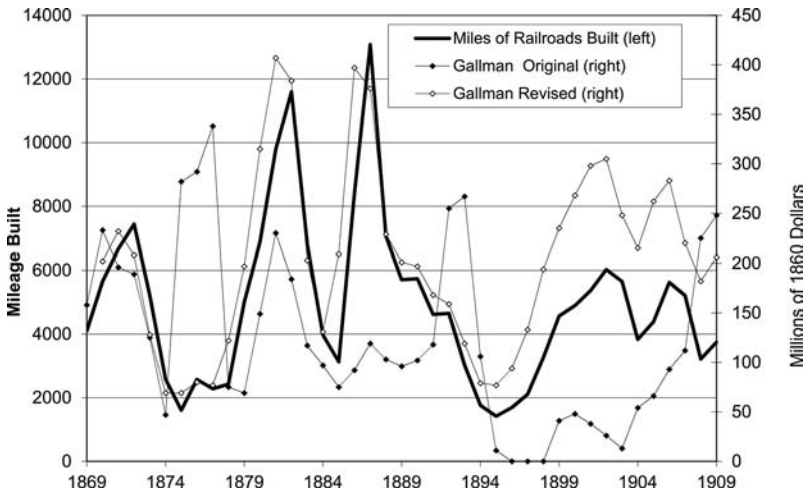


FIGURE 5.8 Railroad mileage and construction estimates. Source: See text.

(excluding land) by steam railroads, and then subtracted estimates of equipment spending based on Shaw's output data to derive his series of annual gross investment for railroad construction (Gallman 1966, 37, note 45; Ulmer 1960, 256, 274). This procedure apparently yielded negative residuals in the 1896–98 period, leading Gallman to replace these estimates with the zeros shown in the table. (As noted above, the original series also contain errors resulting from misplacing the decimal point during the 1875–77 period.) As figure 5.8 illustrates, the timing of the original residual-based series is poorly correlated with numbers of mileage constructed available from *Railway Age*.³¹ Over the 1869–1909 period, the correlation coefficient was only 0.07.

Based on better data on the cost of construction from Albert Fishlow and information on the number of miles of railroads built, Gallman produced in 1994 through 1996 a revised series on railroad construction investment over the 1870–1909 period.³² Although Gallman did create some GNP series using the revised figures, it is questionable whether these data should be considered a “finished product.” Gallman believed that reestimating railroad investment was a fruitful subject for research. For the convenience of those who would prefer to use the revised series and avoid the obvious problems inherent in the original railroad series, table 5.2

includes Gallman's 1994–96 revisions for railroad construction. Again, the effects on the annual GNP estimates are small.

Throughout his work, Gallman relied on what he considered the best available price series, chiefly Dorothy Brady's numbers. But he clearly noted that the "prices count a lot," and that having "more reliable" price series would improve our ability to form better estimates of both constant and current GNP.³³ The differences between the movements of the implicit price deflators displayed in figure 5.4 highlight the importance of treating prices with care.

Another area that seems ripe for reconsideration is the estimation of the product of the service sector, especially for the antebellum period. As noted above, the estimation of noncommodity production and its impact on measured volatility figure prominently in the debates between Romer, Balke-Gordon, and others. Moreover, Gallman considered the service sector estimates for the antebellum sector the weakest in the series, and he worked with Thomas Weiss to improve the benchmark estimates in their volume 34 paper (Gallman and Weiss 1969). The volume 34 decadal estimates, which include data on distribution, transportation, public utilities, banking, insurance, professional and personal services, education, government, and housing, could usefully serve as benchmarks for more comprehensive interpolations and extrapolations than those conducted to estimate the service flows in volume 30.³⁴

Another area that warrants further examination is the estimation of inventory changes over the 1870–1909 period. During the 1990s, Gallman endeavored to supplement his decadal inventory estimates with annual figures (see below). By differencing the inventory stocks, Gallman formed estimates of annual inventory investment, which he added to his volume 30 annual series to create a GNP series closer to the conventional definition. The work to estimate inventory levels was conducted, principally by his research assistants, in the mid-1990s and has not been subject to the same scrutiny as the volume 30 annual series.

An additional concern centers on how the inventory stocks were estimated. The stocks of animals (cattle, swine, sheep, horses, and mules) were estimated separately from those of other goods (imported goods, crops, mined and manufactured goods). Gallman (1992, 109) notes that the procedure for estimating inventories of other goods followed "one employed by Kuznets (*National Product since 1869*, 1946, 228) [in which] inventories were taken as a fixed fraction of the value of imports and the value of outputs of the agricultural, manufacturing, and mining sectors."

Note that this procedure, while reasonable over long periods, builds properties into the high-frequency time series that may be misleading. Specifically, it assumes that the relationship between production and inventory accumulation does not vary over the business cycle.

Also note that if the ratios translating output into inventories fail to capture the effects of improvements in transportation and communications or organizational changes (such as the rise of modern business enterprise), these inventory figures may paint a misleading picture of secular growth. Gallman (1966, 39) observed that

Kuznets' estimates of changes in inventories are, in considerable measure, extrapolations on rates of change of output. Since we have altered these rates of change, the inventory figures should be adjusted. But Kuznets himself has limited confidence in the procedures he used. Application of these procedures to pre-Civil War data would appear to be even more dubious, but no other method is presently available. Consequently, we decided to leave this component out of both the pre- and post-Civil War series.

He cited Kuznets (1961a, 159–60), who expressed concern that using the inventory-output ratios from the 1920s “may have introduced a false stability” into key economic relationships. Others may judge whether to include or exclude the series on annual inventory changes. This discussion serves to highlight that assembling and analyzing data on the evolution of inventory-output relationships over the nineteenth century is potentially a high-value area for future research.

Finally, Gallman made a number of estimates of the value of nonconventional output, including the value of improvements to farmland and of home production activities. To evaluate economic performance over the nineteenth century requires paying full attention to these important activities, and to the shifts between market and nonmarket production.

Table 5.7 displays data on the composition of gross investment flows from Gallman (2000), the last time that he reported statistics derived from the volume 30 series. These conventional measures incorporate changes in the value of inventories (ΔINV) to the investment series, and may be compared to the GNP series that also includes changes in the value of inventories.³⁵ Column 2 of the table also displays the rise in the share in gross investment of manufactured durables, such as machinery, when measured in constant prices. The flow data are consistent with the stock data reported in figure 1.1.³⁶

TABLE 5.7 Percentage shares of gross investment flow series, measured in current and 1860 prices

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Conventional manufactured durables		Construction		Change in inventories		Change in claims on foreigners		Unconventional land clearing
	Current prices	1860 prices	Current prices	1860 prices	Current prices	1860 prices	Current prices	1860 prices	
1834-43		17		63		26		-5	41
1839-48	19	16	57	58	23	23	1	4	22
1844-53	20	18	60	62	23	22	-3	-2	15
1849-58	20	20	59	66	23	17	-2	-3	17
1869-78	26	28	71	62	9	15	-6	-4	8
1874-83	26	33	63	52	11	15	0	0	6
1879-88	25	39	66	48	11	14	-2	-2	4
1884-93	21	42	73	55	8	6	-3	-2	3
1889-98	20	42	71	52	8	6	1	1	2
1894-	25	46	66	45	4	5	5	4	2
1903									
1899-	27	54	65	41	4	2	5	3	1
1908									

Note: Columns 1-8 relate to conventional forms of investment. Ignoring discrepancies due to rounding, (1) + (3) + (5) + (7) = 100, and (2) + (4) + (6) + (8) = 100. Column 9 is land improvements (variant I) divided by the sum of constant-price manufacturing durables, construction, change in inventories, change in claims on foreigners, and land improvements (variant I). The numbers in Gallman 2000, 39, are derived from Gallman 1966, 34-35. Source: Gallman 2000, 39, table 1.12.

5.9. Conclusion

The volume 30 annual series form a key part of our best estimates of nineteenth-century US GNP, NNP, and capital formation, and thus underlie much of what we know about America's economic growth. In his modest, scholarly way, Gallman wanted to make his volume 30 estimates better before releasing them to the world. Even without all the improvements he hoped to make, they remain among the best numbers we have for this period. But it is important to recall Gallman's own caveat: "These data were not constructed for analysis as annual series."