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CHAPTER TWO

# Gallman's Core Capital Stock Data

## 2.1. Introduction

Gallman's core data on the capital stock appear in tables 2.1 and 2.2. The tables present his current-price series, the constant-price (in 1860 dollars) series, and the implicit price deflators that link the two capital stock series.

Table 2.1 summarizes the census-style (point-in-time) estimates of the capital stock by two-digit industrial sector for the 1840–1900 period. They are subdivided into types of capital: equipment, structures, inventories, land improvements, and net foreign claims. They refer to the stock on 1 June of the census year. The principal, though not only, source was the federal census. The US Census Office collected and published reasonably consistent national data on the capital stock for manufactures on a decadal basis from 1840 on, for agriculture from 1850 on, for the mineral industries from 1870 on, and for transportation business in 1880 and 1890, among other economic activities. The availability of the census data provided a powerful impetus to build an estimation framework focused on years ending in nine or zero. Information for activities not covered by the census was to be fit into this framework.

The census years occurred in different phases of the business cycle and did not represent "natural" breakpoints for economic analysis. (Such concerns matter more for annual product flows than for the capital stock, which was accumulated over longer periods.) Gallman's core series began in 1840. This was the first federal census that he felt covered economic activity in a reasonably comprehensive and accurate manner. He

This chapter was written by Rhode.

TABLE 2.1 **Census-style estimates of US capital stock measured in current and 1860 prices, 1840–1900, in millions of dollars**

Panel A. Current prices

| | 1840 | 1850 | 1860 | 1870 | 1880 | 1890 | 1900 |
|---|---|---|---|---|---|---|---|
| **Agriculture** | | | | | | | |
| Buildings | 415 | 599 | 1,277 | 1,949 | 2,115 | 2,760 | 3,560 |
| Equipment | 119 | 152 | 246 | 337 | 407 | 494 | 750 |
| Animals | 445 | 587 | 1,074 | 1,666 | 1,844 | 2,716 | 3,068 |
| Clearing and breaking land | 1,048 | 1,484 | 2,600 | 3,118 | 3,409 | 3,955 | 4,232 |
| Fences | 318 | 432 | 719 | 957 | 1,149 | 1,596 | 2,589 |
| Drainage and irrigation | | < 0.5 | 1 | 7 | 23 | 58 | 120 |
| Irrigation for rice | 5 | 9 | 10 | 4 | 5 | 5 | 10 |
| **Mining** | | | | | | | |
| Improvements | 3 | 5 | 16 | 53 | 145 | 265 | 412 |
| Equipment | 2 | 3 | 9 | 26 | 48 | 86 | 146 |
| **Manufacturing** | | | | | | | |
| Improvements | 75 | 130 | 238 | 536 | 706 | 1,493 | 2,150 |
| Equipment | 70 | 124 | 232 | 536 | 737 | 1,584 | 2,543 |
| **Nonfarm Residences** | 373 | 724 | 1,833 | 2,518 | 4,063 | 9,374 | 11,723 |
| **Trade** | | | | | | | |
| Improvements | 68 | 133 | 336 | 461 | 744 | 1,717 | 2,147 |
| Equipment | 65 | 126 | 319 | 439 | 708 | 1,633 | 2,043 |
| **Shipping** | | | | | | | |
| Improvements | 20 | 28 | 37 | 28 | 27 | 39 | 60 |
| Vessels | 118 | 158 | 210 | 158 | 156 | 221 | 343 |
| **Canals and river improvements** | 110 | 151 | 184 | 168 | 173 | 171 | 211 |
| **Railroads** | | | | | | | |
| Improvements | 61 | 155 | 666 | 1,610 | 2,254 | 3,925 | 4,607 |
| Equipment | 4 | 15 | 74 | 86 | 204 | 337 | 376 |
| **Street railways** | | | | | | | |
| Improvements | | 2 | 8 | 23 | 78 | 210 | 867 |
| Equipment | | 1 | 2 | 6 | 12 | 42 | 207 |
| **Pullman and express cars** | | | | 13 | 31 | 52 | 58 |
| **Telephone** | | | | | | | |
| Improvements | | | | | 3 | 17 | 91 |
| Equipment | | | | | 3 | 18 | 107 |
| **Telegraph** | | | | | | | |
| Improvements | | < 0.5 | 2 | 7 | 13 | 34 | 44 |
| Equipment | | < 0.5 | < 0.5 | 1 | 1 | 3 | 3 |
| **Electric light and power** | | | | | | 41 | 251 |
| **Pipelines** | | | | | | | |
| Improvements | | | | | 10 | 42 | 141 |
| Equipment | | | | | 1 | 2 | 8 |
| **Churches** | 50 | 87 | 171 | 355 | 520 | 679 | 1,040 |
| **Government buildings** | 8 | 10 | 16 | 22 | 46 | 92 | 124 |
| **Schools** | 37 | 69 | 114 | 179 | 281 | 471 | 785 |
| **Inventories** | 655 | 1,150 | 2,000 | 3,568 | 4,836 | 6,583 | 8,978 |
| **Net international assets** | –176 | –63 | –124 | –1,035 | –1,084 | –1,735 | –819 |
| | | | | | | | |
| **Domestic capital variant A** | 4,069 | 6,334 | 12,394 | 18,831 | 24,752 | 40,715 | 53,784 |
| **Domestic capital variant Ā** | 3,746 | 5,893 | 11,664 | 17,863 | 23,575 | 39,056 | 51,065 |
| **Domestic capital variant B** | 2,698 | 4,409 | 9,064 | 14,745 | 20,166 | 35,101 | 46,833 |

*continues*

TABLE 2.1 (*continued*)

Panel A. Current prices

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **National capital variant A** | 3,893 | 6,271 | 12,270 | 17,796 | 23,668 | 38,980 | 52,965 |
| **National capital variant Ā** | 3,570 | 5,830 | 11,540 | 16,828 | 22,491 | 37,321 | 50,246 |
| **National capital variant B** | 2,522 | 4,346 | 8,940 | 13,710 | 19,082 | 33,366 | 46,014 |

Panel B. Constant 1860 prices

| | 1840 | 1850 | 1860 | 1870 | 1880 | 1890 | 1900 |
|---|---|---|---|---|---|---|---|
| **Agriculture** | | | | | | | |
| Buildings | 437 | 624 | 1,277 | 1,523 | 1,627 | 2,044 | 2,697 |
| Equipment | 78 | 115 | 246 | 288 | 485 | 772 | 1,364 |
| Animals | 676 | 791 | 1,074 | 1,111 | 1,545 | 2,055 | 2,220 |
| Clearing and breaking land | 1,424 | 1,861 | 2,600 | 2,817 | 3,797 | 4,338 | 4,740 |
| Fences | 424 | 526 | 719 | 775 | 1,143 | 1,461 | 2,421 |
| Drainage and irrigation | | 1 | 1 | 5 | 18 | 48 | 89 |
| Irrigation for rice | 7 | 12 | 10 | 5 | 6 | 5 | 11 |
| **Mining** | | | | | | | |
| Improvements | 2 | 4 | 16 | 42 | 106 | 223 | 412 |
| Equipment | 2 | 3 | 9 | 25 | 58 | 115 | 271 |
| **Manufacturing** | | | | | | | |
| Improvements | 70 | 120 | 238 | 596 | 619 | 1,641 | 2,416 |
| Equipment | 48 | 90 | 232 | 510 | 970 | 4,950 | 9,082 |
| **Nonfarm Residences Trade** | 393 | 754 | 1,833 | 1,967 | 3,125 | 6,944 | 8,881 |
| Improvements | 65 | 125 | 336 | 485 | 653 | 1,887 | 2,412 |
| Equipment | 46 | 92 | 319 | 375 | 722 | 1,899 | 2,761 |
| **Shipping** | | | | | | | |
| Improvements | 19 | 26 | 37 | 31 | 24 | 42 | 67 |
| Vessels | 69 | 126 | 210 | 188 | 205 | 388 | 673 |
| **Canals and river improvements** | 139 | 182 | 217 | 190 | 190 | 181 | 201 |
| **Railroads** | | | | | | | |
| Improvements | 61 | 176 | 666 | 1,064 | 1,925 | 3,648 | 4,227 |
| Equipment | 5 | 17 | 74 | 139 | 334 | 688 | 875 |
| **Street railways** | | | | | | | |
| Improvements | | 3 | 9 | 20 | 59 | 181 | 794 |
| Equipment | | 1 | 2 | 7 | 19 | 76 | 445 |
| **Pullman and express cars** | | | | 22 | 51 | 106 | 135 |
| **Telephone** | | | | | | | |
| Improvements | | | | | 3 | 14 | 79 |
| Equipment | | | | | 3 | 18 | 112 |
| **Telegraph** | | | | | | | |
| Improvements | | <0.5 | 2 | 5 | 10 | 29 | 39 |
| Equipment | | <0.5 | <0.5 | 1 | 1 | 3 | 3 |
| **Electric light and power** | | | | | | 41 | 235 |
| **Pipelines** | | | | | | | |
| Improvements | | | | | 8 | 33 | 106 |
| Equipment | | | | | 1 | 3 | 25 |
| **Churches** | 53 | 91 | 171 | 277 | 400 | 503 | 788 |
| **Government buildings** | 8 | 9 | 16 | 21 | 44 | 94 | 111 |
| **Schools** | 39 | 72 | 114 | 140 | 216 | 349 | 595 |

TABLE 2.1 (*continued*)

Panel B. Constant 1860 prices

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Inventories** | 763 | 1,270 | 2,000 | 2,575 | 4,530 | 7,570 | 10,026 |
| **Net international assets** | −175 | −70 | −124 | −713 | −1,004 | −1,972 | −931 |
| **Domestic capital variant A** | 4,828 | 7,091 | 12,428 | 15,204 | 22,907 | 42,349 | 59,313 |
| **Domestic capital variant Ā** | 4,397 | 6,552 | 11,698 | 14,419 | 21,740 | 40,835 | 56,792 |
| **Domestic capital variant B** | 2,973 | 4,691 | 9,098 | 11,602 | 17,943 | 36,467 | 52,052 |
| **National capital variant A** | 4,653 | 7,021 | 12,304 | 14,491 | 21,903 | 40,377 | 58,382 |
| **National capital variant Ā** | 4,222 | 6,482 | 11,574 | 13,706 | 20,736 | 38,863 | 55,861 |
| **National capital variant B** | 2,798 | 4,621 | 8,974 | 10,889 | 16,939 | 34,525 | 51,121 |

Panel C. Price indexes

| **Price index numbers** | 1840 | 1850 | 1860 | 1870 | 1880 | 1890 | 1900 |
|---|---|---|---|---|---|---|---|
| **Agriculture** | | | | | | | |
| Buildings | 95 | 96 | 100 | 128 | 130 | 135 | 132 |
| Equipment | 152 | 132 | 100 | 117 | 84 | 64 | 55 |
| Animals | 66 | 74 | 100 | 150 | 119 | 132 | 138 |
| Clearing and breaking land | 74 | 80 | 100 | 111 | 90 | 91 | 89 |
| Fences | 75 | 82 | 100 | 123 | 101 | 109 | 107 |
| **Mining** | | | | | | | |
| Improvements | 95 | 113 | 100 | 127 | 137 | 119 | 100 |
| Equipment | 103 | 105 | 100 | 102 | 83 | 75 | 54 |
| **Manufacturing** | | | | | | | |
| Improvements | 107 | 108 | 100 | 90 | 114 | 91 | 89 |
| Equipment | 145 | 138 | 100 | 105 | 76 | 32 | 28 |
| **Nonfarm residences trade** | 95 | 96 | 100 | 128 | 130 | 135 | 132 |
| Improvements | 105 | 106 | 100 | 95 | 114 | 91 | 89 |
| Equipment | 140 | 137 | 100 | 117 | 98 | 86 | 74 |
| **Shipping** | | | | | | | |
| Improvements | 107 | 108 | 100 | 90 | 114 | 91 | 89 |
| Equipment | 170 | 126 | 100 | 84 | 76 | 57 | 51 |
| **Railroads** | | | | | | | |
| Improvements | 100 | 88 | 100 | 151 | 117 | 108 | 109 |
| Equipment | 79 | 84 | 100 | 62 | 61 | 49 | 43 |
| **Pullman and express cars** | | | | 62 | 61 | 49 | 43 |
| **Telephone** | | | | | | | |
| Improvements | | | | | 126 | 118 | 115 |
| Equipment | | | | | 100 | 100 | 96 |
| **Telegraph** | | | | | | | |
| Improvements | | 92 | 100 | 144 | 126 | 118 | 115 |
| Equipment | | 122 | 100 | 133 | 100 | 100 | 96 |
| **Churches and schools** | 95 | 96 | 100 | 128 | 130 | 135 | 132 |
| **Inventories** | 87 | 91 | 100 | 139 | 107 | 87 | 90 |

Source: See text.

did consider his 1840 numbers weaker than most of the others; the census of agriculture had not yet begun to report data on the capital stock and land values. He also judged the 1870 numbers less solid—due to disruptions during the American Civil War, price volatility, and census underenumeration—and suspected that the 1880 numbers might be low. (Gallman 1986, 191–93). Gallman's estimation process ended in 1900 when other series became available. Indeed, he originally intended to link up his estimates with the Goldsmith series that start in 1900.

Gallman described the relationship of his estimates to the previous literature as follows:

> There is no published capital stock series that covers all of the years and provides all of the details that the new series does. . . . Goldsmith's series (1952) lacks data for 1840, 1860, and 1870 and is not available in as much detail . . . Kuznets's (1946) estimates . . . contain no components for the period before 1880 and no estimates at all of inventories or the foreign sector. Kendrick's figures (which depend upon the work of Ulmer, Tostlebe, Creamer, Borenstein, Dobrovolsky, Barger and others, gathered together in Kuznets, 1961), do not cover all sectors of the economy and do not run back of 1869. As they appear in Kendrick's book, they are also only available in constant prices." [All of these studies were completed before the early 1960s; since then,] "work has come forward that provides a firmer basis for estimates than was previously available.[1]

Table 2.2 presents census-style estimates for the 1774 to 1815 period. Gallman used data from Alice Hanson Jones, Samuel Blodget Jr., and the federal tax records in constructing capital stock estimates for the period before 1840. The figures, which were subdivided by types of capital, were constructed to be comparable to the 1840–1900 series; data to make sectoral divisions were less complete.

In tables 2.1 and 2.2, Gallman presents both "domestic capital" series, covering the stock within the boundaries of the United States, and "national capital" series, covering the stock owned by US nationals. The two differ modestly over the nineteenth century, as indicated by the small magnitude of the "net international assets" series.[2]

Gallman sought to estimate the value of the capital stock in a consistent, forward-looking way. He wanted numbers net of depreciation and independent of backward-looking book (accounting) evaluations. He preferred measures such as market value or reproduction costs. Scholars in economic history often repeat Gallman's summary judgment that the eval-

TABLE 2.2 **Census-style estimates of US capital stock, measured in current and 1860 prices, 1744–1815, in millions of dollars**

| | 1774 | 1799 | 1805 | 1815 |
|---|---|---|---|---|
| **Measured in current prices** | | | | |
| Structures | 67 | 227 | 352 | 697 |
| Animals | 42 | 120 | 160 | 354 |
| Clearing and breaking land | 113 | 380 | 381 | 401 |
| Shipping | 8 | 49 | 80 | 127 |
| Other equipment | 15 | 46 | 65 | 88 |
| Inventories | 39 | 240 | 336 | 443 |
| Net international assets | –22 | –64 | –57 | –55 |
| Domestic capital variant Ā | 284 | 1,062 | 1,374 | 2,110 |
| Domestic capital variant B | 171 | 682 | 993 | 1,709 |
| National capital variant Ā | 262 | 998 | 1,317 | 2,055 |
| National capital variant B | 149 | 618 | 936 | 1,654 |
| **Measured in 1860 prices** | | | | |
| Structures | 84 | 206 | 349 | 450 |
| Animals | 52 | 139 | 167 | 241 |
| Clearing and breaking land | 269 | 479 | 526 | 611 |
| Shipping | 8 | 33 | 46 | 51 |
| Other equipment | 9 | 20 | 29 | 30 |
| Inventories | 59 | 215 | 276 | 315 |
| Net international assets | –27 | –47 | –37 | –30 |
| Domestic capital variant Ā | 481 | 1,092 | 1,393 | 1,698 |
| Domestic capital variant B | 212 | 613 | 867 | 1,087 |
| National capital variant Ā | 454 | 1,045 | 1,356 | 1,668 |
| National capital variant B | 185 | 566 | 830 | 1,057 |
| **Price index numbers** | | | | |
| Structures | 80 | 110 | 101 | 155 |
| Animals | 81 | 87 | 96 | 147 |
| Clearing and breaking land | 42 | 79 | 72 | 66 |
| Other equipment | 161 | 225 | 224 | 289 |

Source: See text.

uations in the census of agriculture and manufactures reflected the depreciated stock valued at market prices. The discussion in the estimating chapters below reveal that Gallman treated this judgment as less than definitive.

Due to problems of data availability, Gallman at times constructed components of the stock estimates by applying perpetual inventory methods to flow data. That is, he combined data on the annual flows of investment with assumptions about depreciation rates to create estimates of

the cumulated total of the capital in place. The bulk of this volume details how he made his estimates, documents the data sources and definitions, justifies his interpretations and assumptions, explains the adjustments and corrections that he made, and provides a battery of consistency tests.

The statistics in table 2.1 and table 2.2 are related to the data reported in chapters 3 and 4 respectively. To avoid confusion, it is helpful to label the variants of the capital stock that Gallman used. Chapter 3 introduces a conventional measure of the capital stock and an unconventional measure including resources devoted to land breaking and clearing, fencing, irrigation, and drainage.[3] Gallman labeled the broad nonconventional measure variant A, and the conventional measure variant B.

Chapter 4 pushes the capital stock series back to 1774. Data limitations led to the use of a somewhat less comprehensive unconventional measure. The estimates in chapter 4 for land improvements included only the resources devoted to land breaking and clearing and not those devoted to fencing, irrigation, and drainage. It will be helpful to label this more narrow unconventional concept as variant $\bar{A}$.

Table 2.1, covering the period from 1840 on, allows the calculation of all three variants. Table 2.2, covering the period before 1840, includes the components needed to calculate variant B and variant $\bar{A}$, but not variant A. Variant A includes all the rows; variant $\bar{A}$ drops the rows for fencing and irrigation/drainage; variant B also drops the row for land clearing and breaking and has none of the numbers on land improvements. The differences between variants A and $\bar{A}$ are small but nontrivial in the periods when both can be computed. In 1850, national capital variant A exceeded variant $\bar{A}$ by 7.0 percent in current prices and by 7.7 percent in 1860 prices. Gallman typically used variant $\bar{A}$ as well as variant B in his longer-run analysis.[4] The concepts for improvements parallel those for capital.

The following notation (in which the prefixes are suppressed) clarifies matters:

Capital variant B = conventionally defined reproducible capital

Capital variant $\bar{A}$ = capital variant B + land clearing and breaking

Capital variant A = capital variant $\bar{A}$ + fencing + irrigation and drainage

Improvements variant B = structures (including farm buildings)

Improvements variant $\bar{A}$ = improvements variant B + land clearing and breaking

Improvements variant A = improvements variant $\bar{A}$ + fencing + irrigation and drainage

Chapter 3 (especially table 3.1) provides a broad overview of the different sources and methods used for the core 1840–1900 period. Chapters 4 and 14 explain the construction of estimates for the colonial and early national periods. Chapter 5 introduces Gallman's annual product data. Chapter 6 compares capital stock estimates made from the perpetual inventory methods applied to annual product flows with those created from census data. Chapters 7 to 12 describe in detail Gallman's estimation methods sector-by-sector. Chapter 13 covers consumer durables. Table 2.3 offers a concordance between the rows in table 2.1 and the tables in chapters 7 through 12.

Several issues merit note:

(1) Canal and river improvements and street railroad improvements in 1860 have different values in constant and current prices. This is odd because the current year is the same as the base year of the constant price series. The discrepancies are a result of accumulating depreciated capital of different vintages. These discrepancies create very small differences (on the order of 0.25 percent in the domestic capital variant A series) between the current and constant valuations of the total capital in 1860. In that year, the two concepts should by definition be identical. No attempt has been made to fix this minor problem.
(2) A similar issue exists for consumer durables.
(3) Electric light and power are defined in 1890 prices rather than 1860 prices. This is a new goods problem without apparent solution, given the lack of useable 1860 prices. This sector first appeared in Gallman's numbers in 1890. (Pipelines and telephones had entered in 1880; Pullman and express cars in 1870; street railways and telegraphs in 1850.) To gauge the magnitude of the new goods problem, note that in 1900, sectors entering after 1840 constituted 3.7 percent of the domestic capital variant A series evaluated at 1860 prices, and 3.5 percent evaluated at current prices. The subset of sectors entering after 1860 constituted 1.5 percent of the total by either measure.
(4) Gallman's estimates did not cover the value of roads, waterworks, or standing timber. See Gallman 1986, 183, 209.
(5) There are a number of small discrepancies. Net international assets is –176 in the 1840 current value cell, but –178 in the backing material. Gallman's price index for trade improvements in 1870 is 95, and not 90, which appears to be more consistent.

TABLE 2.3 **Concordance between table 12.1 and source tables in chapters 7–12**

| Sector | Source tables | | | |
|---|---|---|---|---|
| | Current prices | 1860 prices | Capital variant | Capital type |
| **Agriculture** | | | | |
| Buildings | 7.2 | 7.2 | B | Structures |
| Equipment | 7.2 | 7.2 | B | Equipment |
| Animals | 7.3 | 7.3 | B | Inventories |
| Clearing and breaking land | 7.7 | 7.7 | Ā | Improvements |
| Fences | 7.8 | 7.8 | A | Improvements |
| Drainage and irrigation | 7.11 | 7.11 | A | Improvements |
| Irrigation for rice | 7.11 | 7.11 | A | Improvements |
| **Mining** | | | | |
| Improvements | 8.5 | 8.5 | B | Structures |
| Equipment | 8.5 | 8.5 | B | Equipment |
| **Manufacturing** | | | | |
| Improvements | 8.9 | 8.9 | B | Structures |
| Equipment | 8.9 | 8.9 | B | Equipment |
| **Nonfarm Residences** | 9.11 | 9.11 | B | Structures |
| **Trade** | | | | |
| Improvements | 9.11 | 9.11 | B | Structures |
| Equipment | 9.10 | 9.10 | B | Equipment |
| **Shipping** | | | | |
| Improvements | 10.1 | 10.1 | B | Structures |
| Vessels | 10.1 | 10.1 | B | Equipment |
| **Canals and river improvements** | 10.4 | 10.4 | B | Structures |
| **Railroads** | | | | |
| Improvements | 10.9 | 10.9 | B | Structures |
| Equipment | 10.9 | 10.9 | B | Equipment |
| **Street railways** | | | | |
| Improvements | 10.11 | 10.11 | B | Structures |
| Equipment | 10.12 | 10.12 | B | Equipment |
| **Pullman and express cars** | 10.13 | 10.13 | B | Equipment |
| **Telephone** | | | | |
| Improvements | 11.1 | 11.11 | B | Structures |
| Equipment | 11.1 | 11.11 | B | Equipment |
| **Telegraph** | | | | |
| Improvements | 11.7 | 11.7 | B | Structures |
| Equipment | 11.7 | 11.7 | B | Equipment |
| **Electric light and power** | 11.12 | 11.12 | B | Structures |
| **Pipelines** | | | | |
| Improvements | 10.14 | 10.14 | B | Structures |
| Equipment | 10.14 | 10.14 | B | Equipment |
| **Churches** | 9.12 | 9.12 | B | Structures |
| **Government buildings** | 9.12 | 9.12 | B | Structures |
| **Schools** | 9.12 | 9.12 | B | Structures |
| **Inventories** | 12.5 | 12.5 | B | Inventories |
| **Net international assets** | 12.6 | 12.6 | B | International |

Source: See text.

## 2.3. Wealth Estimates

The backing materials also document the sources for Gallman's wealth estimates. The estimates are available only in current-price terms and begin in 1850 (when the census began to report value of farm land). Gallman defined national wealth to include the reproducible capital, the value of land, and net international assets. He defined domestic wealth to include reproducible capital and the value of land. Thus,

National wealth = capital + value of land + net international assets;

domestic wealth = capital + value of land.

Both wealth concepts exclude paper claims, consumer durables, and human capital, even in the form of property rights to slaves. (Gallman 1986, 166).[5]

Gallman also in places uses the term "real estate." Real estate includes the value of land, structures, and other improvements to land.

Table 2.4 pulls the data together. It presents Gallman's variant A and variant B capital stock estimates in current and constant (1860) price terms. It shows the domestic and national capital series (the difference is the international sector). It also relates the current-price capital stock to wealth, for the 1850 to 1900 period. Wealth equals the value of the capital stock plus the value of land. (The absence of land values, specifically for raw farm land in 1840, prevents the calculation of wealth in that year.) Conventional reproducible national capital (variant B) grew faster than national wealth as a whole over the 1850–1900 period, whereas nonconventional national capital (variant A) grew more slowly.

Gallman did not separately publish the land value estimates that entered in his wealth concept. The backing materials include information about the value of land by sector. Table 2.5 collects the numbers from across the chapters. The results are of independent interest. The share of land in national wealth rose from 20.5 percent in 1850 to 27.6 percent by 1900. The direction of this change may come as a surprise, considering the declining share of agriculture in the American economy. Several points merit mention. First, the calculations consider "raw" land (subtracting structures and improvements). Second, land was an important input in housing as well as agriculture. Farmland made up less than one-half of land value in 1850, and considerably less than one-third by 1900. In 1890 and 1900, the value of

TABLE 2.4 **Wealth and capital stock estimates, measured in current and 1860 prices, 1840–1900, in millions of dollars**

| | 1840 | 1850 | 1860 | 1870 | 1880 | 1890 | 1900 |
|---|---|---|---|---|---|---|---|
| **Measured in current prices** | | | | | | | |
| Domestic wealth | — | 7,953 | 16,515 | 25,242 | 33,382 | 56,657 | 73,936 |
| National wealth | — | 7,890 | 16,391 | 24,207 | 32,198 | 54,922 | 73,117 |
| Domestic capital variant A | 4,069 | 6,334 | 12,394 | 18,831 | 24,752 | 40,715 | 53,784 |
| National capital- variant A | 3,893 | 6,271 | 12,270 | 17,796 | 23,668 | 38,980 | 52,965 |
| Improvements, variant A | 2,591 | 4,018 | 8,228 | 11,995 | 15,764 | 26,944 | 35,154 |
| Equipment[c] | 378 | 579 | 1,092 | 1,601 | 2,307 | 4,510 | 6,832 |
| Inventories[ac] | 1,100 | 1,737 | 3,074 | 5,234 | 6,680 | 9,299 | 12,046 |
| International sector[bc] | –176 | –63 | –124 | –1,035 | –1,084 | –1,735 | –819 |
| Domestic capital variant B | 2,698 | 4,409 | 9,064 | 14,745 | 20,166 | 35,101 | 46,833 |
| National capital variant B | 2,522 | 4,346 | 8,940 | 13,710 | 19,082 | 33,366 | 46,014 |
| Improvements, variant B | 1,220 | 2,093 | 4,898 | 7,909 | 11,178 | 21,330 | 28,203 |
| **Measured in 1860 prices** | | | | | | | |
| Domestic capital variant A | 4,828 | 7,091 | 12,428 | 15,204 | 22,907 | 42,349 | 59,313 |
| National capital- variant A | 4,653 | 7,021 | 12,304 | 14,491 | 21,903 | 40,377 | 58,382 |
| Improvements, variant A | 3,141 | 4,586 | 8,262 | 9,963 | 13,983 | 23,706 | 31,321 |
| Equipment[c] | 248 | 444 | 1,092 | 1,554 | 2,848 | 9,056 | 15,978 |
| Inventories[ac] | 1,439 | 2,061 | 3,074 | 3,686 | 6,075 | 9,625 | 12,246 |
| International sector[bc] | –175 | –70 | –124 | –713 | –1,004 | –1,972 | –931 |
| Domestic capital variant B | 2,973 | 4,691 | 9,098 | 11,602 | 17,943 | 36,467 | 52,052 |
| National capital variant B | 2,798 | 4,621 | 8,974 | 10,889 | 16,939 | 34,525 | 51,121 |
| Improvements, variant B | 1,286 | 2,186 | 4,932 | 6,361 | 9,019 | 17,854 | 24,060 |

Notes:
[a] Excluding inventories of monetary metals
[b] Including inventories of monetary metals
[c] Same in variants A and B.
This table corrects an error in the 1880 national wealth variant A figure. To be consistent with underlying data, it uses 32.32 instead of 32.22, which appeared in Gallman 1986, 204. The sources of the small difference between the current and constant value series in 1860 are discrepancies in the evaluation of canal and river improvements and of street railroad capital.
Sources: See text.

land in the nonfarm residential real estate sector exceeded that in agriculture.[6] Third, these land figures exclude structures and other improvements. If the value of other improvements is included, the value of land in agriculture exceeded that in the nonagricultural residential sector. But if the value of structures is then added, the value of real estate in the nonagricultural residential sector exceeded that in agriculture.

Gallman's figures can be compared with those of Raymond Goldsmith (1952), who built his pre-1900 wealth estimates from the federal census. Goldsmith questioned the consistency of its valuation method, which included original cost, book value, and market value / reproduction cost basis approaches. Goldsmith (1952, 264) thought the margin of error in his

TABLE 2.5 **Value of land at current prices, 1840–1900, in millions of dollars**

| | 1840 | 1850 | 1860 | 1870 | 1880 | 1890 | 1900 |
|---|---|---|---|---|---|---|---|
| **Panel A. Total value** | | | | | | | |
| Total land | — | 1,619 | 4,121 | 6,411 | 8,530 | 15,942 | 20,152 |
| Raw farmland | — | 748 | 2,039 | 3,226 | 3,496 | 4,905 | 6,104 |
| Mineral land | 9 | 21 | 67 | 203 | 457 | 818 | 1,271 |
| Manufacturing land | 86 | 143 | 250 | 536 | 671 | 1,318 | 1,522 |
| Non-ag residential land | 212 | 413 | 1,045 | 1,435 | 2,315 | 5,342 | 6,681 |
| Trade land | 127 | 246 | 623 | 857 | 1,382 | 3,188 | 3,988 |
| Shipping land | 27 | 36 | 48 | 36 | 35 | 50 | 78 |
| Railroad land | 4 | 11 | 47 | 113 | 158 | 275 | 323 |
| Street RR land | | 1 | 2 | 5 | 15 | 41 | 157 |
| Telephone land | | | | | | 1 | 8 |
| Electric light & power land | | | | | | 2 | 12 |
| Pipeline land | | | | | 1 | 2 | 8 |
| **Panel B. Value of real estate** | | | | | | | |
| Agricultural real estate | — | 3,272 | 6,646 | 9,261 | 10,197 | 13,279 | 16,615 |
| Agricultural buildings | 415 | 599 | 1,277 | 1,949 | 2,115 | 2,760 | 3,560 |
| Other ag improvements | 1,371 | 1,925 | 3,330 | 4,086 | 4,586 | 5,614 | 6,951 |
| "Raw" farmland | — | 748 | 2,039 | 3,226 | 3,496 | 4,905 | 6,104 |
| Non-ag residential real estate | 585 | 1,137 | 2,878 | 3,953 | 6,378 | 14,716 | 18,404 |
| Non-ag residences | 373 | 724 | 1,833 | 2,518 | 4,063 | 9,374 | 11,723 |
| Non-ag residential land | 212 | 413 | 1,045 | 1,435 | 2,315 | 5,342 | 6,681 |
| Trade real estate | 195 | 379 | 959 | 1,318 | 2,126 | 4,905 | 6,135 |
| Trade improvements | 68 | 133 | 336 | 461 | 744 | 1,717 | 2,147 |
| Land used for trade | 127 | 246 | 623 | 857 | 1,382 | 3,188 | 3,988 |
| **Panel C. Value per acre** | | | | | | | |
| "Raw" farmland, dollars/acre | — | 2.55 | 5.01 | 7.91 | 6.55 | 7.87 | 7.26 |
| **Panel D. Percentage share of wealth** | | | | | | | |
| Total land relative to | | | | | | | |
| domestic wealth | — | 20.4 | 25 | 25.4 | 25.6 | 28.1 | 27.3 |
| national wealth | — | 20.5 | 25.1 | 26.4 | 26.4 | 29 | 27.6 |
| Nonagricultural residential real estate relative to | | | | | | | |
| domestic wealth | — | 14.3 | 17.4 | 15.7 | 19.1 | 26 | 24.9 |
| national wealth | — | 14.4 | 17.6 | 16.3 | 19.8 | 26.8 | 25.2 |

Note: The value of "raw" farmland is computed as the value of farms minus the value of buildings, land clearing and breaking, fences, irrigation, and drainage.
Source: See text.

TABLE 2.6 **Comparison of Gallman and Goldsmith, in billions of current dollars**

| | 1850 | 1880 | 1890 | 1900 |
|---|---|---|---|---|
| Gallman national capital,variant B | 4.4 | 19.0 | 33.4 | 46.0 |
| Goldsmith reproducible tangible assets | 4.2 | 23.5 | 41.7 | 57.8 |

Source: Goldsmith 1952, 306; derived from column 2 minus column 17.

TABLE 2.7 **Current-value capital-to-output and wealth-to-output ratios, 1840–1900**

| | 1840 | 1850 | 1860 | 1870 | 1880 | 1890 | 1900 |
|---|---|---|---|---|---|---|---|
| National wealth/GNP | — | 2.98 | 3.88 | — | 3.31 | 4.38 | 4.48 |
| Domestic wealth/GNP | — | 3.00 | 3.91 | — | 3.42 | 4.52 | 4.53 |
| National capital/GNP | 2.16 | 2.37 | 2.90 | — | 2.44 | 3.11 | 3.24 |
| Domestic capital/GNP | 2.26 | 2.39 | 2.93 | — | 2.54 | 3.25 | 3.29 |

Notes: Wealth and capital stock are current-value variant A series. Wealth is capital plus land.
Source: Current-price GNP from Gallman 2000, table 1.6. 1840 GNP is the average of 1834–43; 1850 is 1844–53; 1860 is 1859; 1880 is 1874–83; 1890 is 1884–93; and 1900 is 1894–1903.

estimates was "hardly less than 10 to 20 percent at any date"; the margin became worse the further he pushed his estimates back in time. Goldsmith continued: "It is not certain that comparability is impaired by as much as the size of the margin may imply because the error probably tends in the same direction for most if not all benchmarks." Comparisons within the dataset may not suffer, but comparisons with other sources of data certainly do. Table 2.6 compares Gallman's current-value national capital variant B numbers with Goldsmith's (1952, 308) reproducible tangible assets figures (excluding consumer durables). Gallman's estimates are slightly higher than Goldsmith's in 1850, but are much lower by the end of the nineteenth century (see also table 3.4).

Table 2.7 reports that capital-to-GNP ratios calculated from Gallman's current-price estimates yield numbers for the second half of the nineteenth century ranging between about 2.4 and 3.3.[7] The analogous wealth-to-GNP ratios range between about 3.0 and 4.5. The ratios rise over the period, with an interruption in the decades right after 1860. The temporary fall is possibly due to Civil War–era destruction (Goldin and Lewis 1975). These capital-to-output ratios differ slightly from those in Gallman (1986) principally due to the use of different GNP numbers in the denominator. Gallman (1986, 192) also reports lower ratios in 1880 than in 1860.[8] This picture contrasts with the smooth rise over this period appearing in Piketty and Zucman (2015).

TABLE 2.8 **Price Indexes for GDP and capital, 1840–1900**

| | 1840 | 1850 | 1860 | 1870 | 1880 | 1890 | 1900 |
|---|---|---|---|---|---|---|---|
| GDP deflator | 94 | 93 | 100 | 131 | 106 | 96 | 92 |
| Domestic capital, variant A | 91 | 92 | 100 | 125 | 109 | 106 | 105 |
| Improvements, variant A/B | 74 | 80 | 100 | 114 | 92 | 95 | 93 |
| Improvements, variant B | 97 | 96 | 100 | 127 | 126 | 125 | 123 |
| Equipment | 145 | 130 | 100 | 104 | 83 | 61 | 53 |
| Inventories | 80 | 85 | 100 | 143 | 111 | 103 | 107 |

Note: Telegraph equipment is excluded because price information is not available for 1840. Improvements, variant A/B, are the components included in variant A that are not included in variant B.
Sources: GDP deflator from Carter et al. 2006, Ca13. Capital price indexes, table 2.1. $Pt_{,C} = Sum(Pt_{,c} * K_{1860,c} / Sum[K_{1860,c}])$.

The change in the capital-to-output ratio in current prices is driven in part by prices and in part by quantities. The evidence on price movements in table 2.8 helps to sort out the effects. The series have other important implications of note. The table presents information of the GDP deflator from 1840 to 1900, using a base of 1860 = 100. It also presents price series for types on capital based on the price indexes in table 2.1 weighed by the stock of capital in 1860. As an example, the equipment price series is derived by multiplying the individual equipment components in 1860 by the price indexes for each specific year, summing the total, and then dividing by the 1860 sum. What the series show is that the price of capital rose in the 1860s, but slightly more slowly than the GDP deflator. In the 1870s, the price of capital fell, but more slowly than the GDP deflator. Overall the relative price of capital increased between 1860 and 1880; consequently, the fall of the current-price capital-to-output ratio over that period is not simply a nominal phenomenon.

One other notable feature of the price data is the contrasting movement of the price of improvements and equipment. The price of improvements rose between 1840 and 1900 relative to the GDP deflator. This is true for the improvements included in variant B and those included in variant A exclusively. The price of equipment fell sharply relative to the GDP deflator (see also Brady 1966). Moreover, the price of equipment declined continuously, relative to the price of improvements included in variant B, which as a shorthand term we can call structures. The price ratio of equipment to structures in 1900 was less than three-tenths (28.8 percent) of what it was in 1840. Over the same period, the quantity ratio of equipment to structures (where quantities are measured by the stocks

in fixed 1860 prices) increased almost 3.5 times. The changes in relative quantities reflected both substitution within specific sectors to higher equipment-to-structure ratios, and the more rapid expansion of sectors (such as manufacturing and trade) characterized by high equipment-to-structure ratios.[9] Gallman was always quick to point out the greater importance of structures relative to equipment in the US capital stock during the nineteenth century. But these price and quantity movements give life to the image of the period as the "age of the machine." That was what was new and different.

## 2.6. Conclusion

This chapter has laid out Gallman's main capital stock tables. Chapters 7 through 14 will describe the derivation of Gallman's estimates in detail. Chapters 3 and 4 reproduce Gallman's interpretations of the main results from the series, for the core 1840–1900 period and the 1774–1980 period, respectively.