

APPENDIX to:  
Economic Growth in the Mid Atlantic Region:  
Conjectural Estimates for 1720 to 1800

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Our estimates of per capita GDP growth for the states and colonies of the middle Atlantic region are based on a variant of the method of controlled conjectures pioneered by Simon Kuznets, popularized by Paul David, and modified by Weiss.<sup>1</sup> Our version of the estimating equation is the modified one presented by Weiss (1994).

$$\text{GDP/P} = (\text{LF/P}) [S_a (\text{O/LF})_a + (1 - S_a) (\text{O/LF})_n] + (\text{O}_s)$$

GDP/P = gross domestic product per person

LF/P = the labor force participation rate (Labor Force aged 10 and over)

S<sub>a</sub> = the agricultural share of the labor force

O/LF = output per worker

a and n are subscripts denoting agriculture and nonagriculture

O<sub>s</sub> = the value of shelter output

The conjectures for the colonial period proceed backward in time. We first establish benchmark values for 1800 and then estimate values of the terms on the right hand side of the equation for earlier years. We then calculate an index of those values, excluding the value of shelter, which are used to extrapolate the 1800 value of the non-shelter portion of GDP per capita to earlier years. The value of shelter is then added to those extrapolated values to obtain estimates of GDP per capita.

There are two sections to the appendix. The first describes the estimates of the base year values, the second describes how we derived the series necessary to extrapolate these backward.<sup>2</sup>

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<sup>1</sup> Simon Kuznets "Long Term Changes" and Paul David, "The Growth of Real Product." See also Thomas Weiss in "U.S. Labor Force Estimates."

<sup>2</sup> In a separate paper and appendix we have described the details of our estimates of agricultural exports, which form part of agricultural output. In this appendix we have reproduced only a summary table of the value of exports from 1720 to 1800.

## I. Estimates for the Base Year

We constructed estimates of GDP and its components in the base year of 1800 for colonists and their slaves. When necessary for purposes of extrapolation, and whenever possible otherwise, we produced separate estimates for the colonists and for the slaves. The figures are shown in Table A-1, and their derivation explained in the text that follows. These 1800 base year figures can be thought of as known or given values. They are, of course, not known with the precision or completeness of official statistics. Instead, they are known or given in the sense that they were not generated by our conjectures about the colonial economy, but rather were taken from existing work. It is these known pieces of information at the end of the time period of our study that set bounds on the growth that could have occurred over the preceding century.<sup>3</sup>

### *GDP per capita in 1800*

The figures for GDP and its components for the U.S. in 1800 were taken from Weiss (1994).<sup>4</sup> The GDP figures for the Mid Atlantic region in 1800 were derived by extrapolating backward an estimate of the region's GDP per capita for 1840. The extrapolating index was constructed as the product of indexes measuring changes in the same variables that underlie the estimates of the national figures – i.e. changes in the agricultural share of the region's labor force, changes in the region's labor force participation rate, changes in agricultural productivity, and an assumption that the ratio of non-agricultural productivity to agricultural productivity remained constant over the period at the value established for 1840. It was further assumed that agricultural productivity in the region changed at the national rate between 1800 and 1840. The estimate is shown in Table A-2.

The region's GDP per capita for 1840 is based on the estimates of Easterlin. According to Easterlin (1960) the per capita income for the Mid Atlantic in 1840 was equal to between 115

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<sup>3</sup> These figures were conjectured in ways that leave the 1800 figures unbiased by business cycle influences that may have occurred. It does assume that the degree of market orientation was the same in 1800 as in 1840.

<sup>4</sup> The figures shown in Appendix Table 1 differ slightly from Weiss's earlier figures for the U.S. because we have calculated a revised estimate of the value of shelter (\$6.49) which differs from the earlier estimate of \$5.50.

and 120 percent of the per capita figure for the nation.<sup>5</sup> We have used the higher of his two estimates for 1840 in our extrapolation so as to bias upward the estimate of GDP per capita for the region in 1800 and thereby maximize the possibility of economic growth in the century leading up to 1800. The 1800 figure we derived equaled 118 percent of the U.S. figure for that year, slightly lower than the 120 percent figure for 1840. The slightly lower relative position of the region in 1800 reflects two things. The region's participation rate was equal to 89 percent of the nation's in 1840, but only 85 percent in 1800. At the same time, the region had shifted out of agriculture more rapidly between 1800 and 1840, so its agricultural share of the labor force in 1800 was higher relative to the nation's than it was in 1840 (95 vs. 82 percent).

### *Agricultural Output*

Our measure of agricultural output is comprised of food that was produced within the region for consumption within the region ( $f$ ) and those agricultural products that were exported either abroad ( $x_a$ ) or to other colonies ( $x_o$ ).<sup>6</sup>

$$O_A = f + x_a + x_o$$

Our estimate of food production includes the value of wheat that went into producing flour for consumption within the region. Some flour output is explicitly measured in our export series where it is treated as an agricultural item for purposes of calculating that sector's output and productivity, but the value added to flour that was consumed within the region is included in the residual measure of manufacturing output.

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<sup>5</sup> Easterlin produced two variants of income: variant A, which includes income originating in commerce, puts the region's income at 120 percent of the nation's, while variant B, which excludes income from commerce, puts it at 115 percent. (Easterlin, 1960, pp. 97-98, Table A-1).

<sup>6</sup> We treat all this agricultural output as though it were marketed in order to place a value on it and to make our estimates comparable in scope to those for the early part of the nineteenth century. Our measure of agricultural output excludes the small value of nonfood items that were consumed domestically. For the colonies and states of the Mid Atlantic, these nonfood items were not of much importance in domestic consumption. Their inclusion would change the average value of agricultural output per capita by only a small amount, and is not likely to have affected the trend. To the extent they were used domestically, they are included in the residual measure of other nonagricultural products

The value of food produced for consumption within the region is a key estimate because of its relative importance in GDP or any measure of aggregate output. We calculate this quantity as the sum of food consumed in the region minus food imports from abroad and from other colonies. For the entire colonial territory, we would not need to take interregional trade in foodstuffs into account because what would have been imported into one region and consumed there was still produced within the colonies or states.<sup>7</sup> For any region, however, the identity between consumption and production no longer holds, and the value of imported food could have been more substantial than it was for all the colonies. Thus for the Mid Atlantic we needed to consider agricultural imports from other regions, as well as imports of food from abroad (food exports abroad are included in the general measure of exports and food exports to other colonies and states are discussed below).

The value of food **consumed** in the region is the sum of that consumed by free persons and slaves. Food consumption for each of several population groups – free adults, free children and slaves - in the Mid Atlantic in 1800 was calculated as the product of each group's relative level of consumption times the national average estimate of food consumed per person in 1800. That national average figure was obtained by extrapolating the 1840 figure for food consumed per person backwards to 1800 with adjustments made to reflect three changes in the makeup of the population that had occurred: shifts in the free and slave shares of the population, shifts in the adult and child shares, and changes in the urban share. It was assumed that the underlying consumption standard for each population component (such as adult or child) had remained constant and equal to that for 1840, wherein consumption by a free child equaled one-half that of a free adult, and that of a slave equaled three-fourths that of a free adult.<sup>8</sup> In both 1840 and 1800,

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<sup>7</sup> Thus Mancall and Weiss did not have to address this issue in their estimate of GDP for all the colonies. And, because the value of food imported from abroad was quite low, they assumed that all food consumed in the colonies was produced somewhere within the colonial territory without actually knowing where it was produced. The value of imported food amounted to about 30 million dollars in 1840, or \$1.75 per person. This figure, however, included some reexports as well as a substantial markup for the value of distribution services. If the figure were adjusted to exclude reexports and revalued at farm prices, it would be substantially less than \$1.75 and so Mancall and Weiss thought it reasonable to ignore food imports from abroad for the colonies as a whole.

<sup>8</sup> These assumptions were made of necessity, but receive support from Gallman's study of perishable consumption over time. See Gallman, "The Statistical Approach: Fundamental Concepts Applied to History," in G.R.Taylor and L.F.Ellsworth, eds. *Approaches to American Economic History*. Charlottesville, 1971, and Sara McMahon "A

the Mid Atlantic population was predominantly free persons with the consequence that the average consumption per person for the region was above that for the nation by about \$2 in 1840 and \$1 in 1800.

The value of food produced for domestic consumption in 1840 was derived by subtracting from the value of agricultural products those items that were not food (e.g. firewood, cotton, tobacco, etc.) and the value of crude and manufactured food exports. (See Gallman, vol. 24, table, A-2 and Susan Carter, et al., *Historical Statistics*, series Ee448-449). Because we wanted a figure to represent farm production, we valued the food at farm prices and thereby excluded the value of distribution included in the prices that the consumers would have ultimately paid. The per capita value for the nation in 1840 was \$31. The extrapolation back to 1800 with adjustments made for the different composition of the population and their different consumption standards yielded a per capita figure of \$29.98 for the U.S. and \$30.85 for the Mid Atlantic.

In order to estimate agricultural production, we reduced the estimate of food consumed by the value of food supplied from elsewhere. Conceptually this is a fairly straightforward task. The value of food produced in the region for consumption within the region (  $f$  ) equals the value of food consumed in the region (  $f_c$  ) less the value of any food imported from other colonies (  $f_o$  ) as well as from other countries (  $f_m$  ).

$$f = f_c - f_o - f_m$$

Our estimate of food imports per capita into the Middle Colonies from foreign countries for 1800 is the product of the 1800 value of food imports per capita for the nation and the regional/total ratio of the per capita food imports for 1768-72.

For the 1800 national figure, we first subtracted the value of imports that were re-exported from the total value of merchandise imports to obtain imports retained for consumption, which we then deflated by the David-Solar price index shifted to a base of 1840<sup>9</sup> We estimated

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Comfortable Subsistence: The Changing Composition of Diet in rural New England, 1620-1840," *William and Mary Quarterly*, XLII Jan. 1985, pp. 54 and 56 ).

<sup>9</sup> Total merchandise exports are from Carter et al, *Historical Statistics of the United States*, series Ee368; re-exports are from Pitkin, 1816; the David-Solar index is from Carter, et al, *ibid*, Series Cc2.

the food share as 29 percent of the total, divided by the population, calculated a 3-year moving average, and multiplied that national 3-year average by the 1768-72 ratio of regional to total food imports per capita.<sup>10</sup> In 1768-72 food imports per capita into the region (in 1840 prices) were \$1.54 versus \$1.19 for all colonies, giving a ratio of 1.29 (see Table A-3).

The evidence for 1768-72 came from James Shepherd (1970, “Commodity Imports” Tables 1 and 2), who presented data on imports into individual British North American colonies from Southern Europe, the Wine Islands, and the West Indies. The only commodities Shepherd reported the Mid Atlantic imported from Southern Europe and the Wine Islands were wine and salt, both of which we classified as food items. Consequently we have assumed that 100 percent of imports from this source were food. Shepherd reported seven items imported from the West Indies, six of which were food items (coffee, molasses, rum, salt, sugar, and wine). These six items made up 87 percent of imports from the West Indies. Imports of food from Great Britain were calculated as 3 percent of all imports from that source. The total import figure was taken from Susan Carter, et al (2006, *Carter et al, Historical Statistics of the United States*, Series Eg452-455). The food share of 3 percent was calculated from evidence in Smith (1995, “Prices and the Value of English Exports in the Eighteenth Century: Evidence from the North American Colonial Trade,” Table 5).<sup>11</sup> He reports only 6 food items among the exports from England and Wales to the continental colonies: salt, cheese and foodstuffs, beer and beverages, which were produced domestically, and pepper, salt, and tea which were re-exports. Combined, these 6 items comprised only 3 percent of the total of exports plus re-exports. These imports from abroad in 1768-72 are shown in Table A-3.

The value of food imports from other colonies was smaller than from abroad, but still not negligible. Fortunately, we have the evidence compiled by Shepherd and Williamson (1972, p. 798, table 2) for 1768-1772. According to their evidence, the total value of imports into the Middle Colonies from other colonies averaged 178,000 Pounds Sterling (current prices) annually from 1768 to 1772. Not all of this was food, and not all was retained for consumption in the region. The imported food items, including rum, amounted to 87 percent of the total; 106,000

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<sup>10</sup> The 29 percent is the average of the food share of merchandise imports for 1768-72, 1821, 1830, 1840. The 1768-72 share was calculated from the data in Table A-3. The shares for 1821, 1830 and 1840 are from Carter, et al, *Historical Statistics of the United States*, Series Ee452 454 and Ee455.

<sup>11</sup> Capital goods and manufactured consumer goods dominated the imports from Great Britain, both those produced domestically there and those re-exported to the colonies through Great Britain

Pounds Sterling or \$831,568 in prices of 1840.<sup>12</sup> The per capita value of food imported from other colonies in 1768-72 was \$1.50.<sup>13</sup>

We estimated the 1800 benchmark values for food imports into the Middle colonies by extrapolating the 1768-72 forward. An estimate of the region's imports from other states was derived for 1790-92 by multiplying the 1768-72 value of exports per ton entered by reported figures for the coastal tonnage entering the ports of New York and Pennsylvania, and inflating these to obtain the value for the Middle Atlantic Region. The average per capita value of imports for 1790-92 was then extrapolated forward to 1802 in two parts, using 3 year averages of the stock of registered and licensed tonnage. The 1790-92 figure was first extrapolated to 1794 based on the gross tonnage engaged in coastal and internal trade. The 1794 figure was then extrapolated forward based on the enrolled tonnage and the tonnage of licensed vessels employed in the coasting trade in the states of the Middle Atlantic.<sup>14</sup> This yielded a single-year estimate of food imports per capita of \$2.96 and a three-year average of \$2.98.

#### *Agricultural exports to other colonies and states*

To estimate the value of agricultural products shipped from the Middle Colonies to other colonies and states, we started with the evidence for 1768-72 compiled by Shepherd and Williamson. That evidence indicates a total value of exports from the Middle Colonies to other colonies of 220 thousand Pounds Sterling (current prices) or \$1,035,425 in prices of 1840, yielding a per capita value of \$1.87 (in 1840 prices). Food made up the bulk of these exports, amounting to \$1.67 per capita annually. For purposes of our estimation, we have assumed that all the exports to other colonies were food, which has the effect of biasing upward agricultural

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<sup>12</sup> Instead of deflating by a general price index, we revalued the individual items using Philadelphia prices for 1840.

<sup>13</sup> Because we have included the value of rum in the value of the region's exports, we have included rum in the import figures as well. If we excluded the import of the rum that was re-exported from the food import total, the net food imports would have averaged about \$1.00 per capita per year between 1768 and 1772.

<sup>14</sup> The tonnage data are from Susan Carter et al, *Historical Statistics of the United States*, Series Df591 and *New American State Papers, Commerce and Navigation*, vol.4 pp. 453-55. The U.S. figures include periodic corrections for ships lost, abandoned etc, and we adjusted the state figures in 1794 and 1797 to be consistent with the U.S. totals. Implicitly we are assuming that the correction applied in equal proportion to each state.



production at the end of the colonial period, and thus biasing upward the rate of growth of agricultural output per worker.

We estimated the 1800 benchmark value of the Middle colonies' export of agricultural products to other colonies in the same manner as we estimated the region's import of food. We first estimated the region's exports to other states for 1790-92 by multiplying the 1768-72 value of exports per ton cleared by the reported figures for coastal tonnage clearing the ports of New York and Pennsylvania, and inflating these to obtain the value for the Middle Atlantic Region. The average per capita values of coastal exports for 1790-92 were then extrapolated forward to 1802 in two parts, using three-year averages of the stock of registered and licensed tonnage. The 1791 figure was first extrapolated to 1794 based on three-year averages of the gross tonnage engaged in coastal and internal trade. The 1794 figure was then extrapolated forward based on three-year averages of enrolled tonnage and the tonnage of licensed vessels employed in the coasting trade in the states of the Middle Atlantic.<sup>15</sup>

The resulting estimates were a single-year value of \$3.11 in 1800 and a 3-year average centered on 1800 of \$3.13. This coastal export figure appears very much in line with estimates for 1824 and later. Herbst's estimated shipments from New York and Philadelphia to the South for 1824 amounted to a per capita value of \$4.96 in 1840 prices for the Middle Atlantic states, (\$5.08 if Del. is excluded from the region). Fishlow's figures show that the Northern states' (Middle Atlantic and New England) exports to the South amounted to \$12.52 per capita in 1839, \$10.15 in 1849 and \$20.76 in 1860. The North includes the Middle Atlantic and New England so cannot be compared directly to the Middle Atlantic figures reported by Herbst. But if we assume that both New England and the Middle Atlantic states exported at the same rate per capita, then there seems to have been a noticeable rise in the importance of interstate trade over time, but it occurred after 1824. Before 1824, and perhaps all the more so before 1800, interstate trade was but a fraction of what it was to become. Additionally, our estimate of exports to other regions implies a rate of growth in the per capita value between 1800 and 1824 about equal to that between 1824 and 1839, and between 1839 and 1860.

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<sup>15</sup> The tonnage data are from Susan Carter et al, *Historical Statistics of the United States*, Series Df591 and *New American State Papers, Commerce and Navigation*, vol.4 pp. 453-55. The U.S. figures include periodic corrections for ships lost, abandoned etc, and we adjusted the state figures in 1794 and 1797 to be consistent with the U.S. totals. Implicitly we are assuming that the correction applied in equal proportion to each state.

The 1800 value of agricultural exports to foreign destinations, valued in prices of 1840, was calculated as 65 percent of total exports. The 65 percent share comes from our estimates for the period 1720 to 1770 as described below.

### *The Value of Shelter in 1800*

For both the Middle Atlantic and the U.S. the estimates of shelter are based on the value of the stock of dwellings in 1798 and the ratio of the annual flow of shelter to that stock.<sup>16</sup> The 1798 figures on the stock of dwellings came from the statistics collected by the Secretary of the Treasury as part of the Direct Tax assessed in that year.<sup>17</sup> Lee Soltow has examined and analyzed those figures and adjusted them for omitted values of dwellings.<sup>18</sup> We used his adjusted figures on the number of dwellings and average value per dwelling by state.

Gallman argued that Soltow's figures pertained to the free population so added an estimate of the value of slave dwellings based on the value of dwellings that had been omitted from the Treasury report.<sup>19</sup> Those dwellings, however, were located primarily in the South. For the Mid Atlantic region, we derived an estimate of the value of dwellings per free person and per

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<sup>16</sup> The US estimates shown in the present paper differ from earlier estimates by Mancall and Weiss, "Was Economic Growth Likely," and Mancall, Rosenbloom and Weiss, "Conjectural Estimates," which used a ratio of shelter to dwelling value of 22 percent that had been provided by Robert Gallman in private communication. Because that ratio now seems much too high, we have used a shelter/dwelling ratio of 10 percent. We have also used Soltow's estimate of the value of dwellings for 1800, instead of an earlier estimate based on Gallman's capital stock estimates.

<sup>17</sup> The original figures from Timothy Pitkin, *A Statistical View of the Commerce of the United States*, are reproduced in Lee Soltow, *Distribution of Wealth and Income in the United States in 1798*, p. 255, Appendix 1, Table A.

<sup>18</sup> Soltow adjusted the original figures to account for the value of dwellings that were unreported, namely those valued at less than \$100. The revised totals and average value per dwelling by state are reported in Soltow, *Distribution*, Table 10. The method for adjusting the figures to account for the unreported dwellings can be found in Lee Soltow and Aubrey Land, "Housing and Social Standing in Georgia, 1798," *The Georgia Historical Quarterly*, 1980, LXIV, 448-458

<sup>19</sup> Robert Gallman, worksheets Table T-1 underlying "American Economic Growth before the Civil War: The Testimony of the Capital Stock Estimates," in Robert Gallman and John Wallis, *American Economic Growth and Standard of Living before the Civil War*, 1992. Gallman put the value of slave dwellings at only \$1,000,000, which would be a per capita value of \$1.12 or \$5.60 per family, assuming an average size of five.

slave as follows.<sup>20</sup> We assumed that an appropriate gauge of the value of slave dwellings could be calculated as the product of the U.S. ratio of the average value of the omitted dwellings (\$40) to the average value of all dwellings (\$262) which was 0.153. And we assumed that the average occupancy of each dwelling was the same for free persons and slaves, so this percentage can be applied to the average value of dwelling per capita as well.<sup>21</sup> That average dwelling value per slave was then multiplied by the slave population to yield the total stock of slave housing in the region. That total in turn was deducted from the total value of dwellings to obtain the stock of dwellings for the free population, which was divided by the free population to obtain an average value of dwelling per free person in each state.

In order to obtain an annual value of shelter for 1800, we multiplied the value of dwellings by a ratio of the annual flow of shelter to the stock of 10 percent. Soltow put the rental ratio at 10 percent in his analysis of the stock of dwellings in 1798, while Goldsmith (1952, p. 319) thought house rents in the nineteenth century ran between 8 and 10 percent. And, a comparison of the estimates of the value of shelter for 1839-99 reported in Gallman and Weiss, "Service Industries," p. 330 with estimates of the value of dwellings for 1839 to 1899 yields an average ratio of 9.5 percent.<sup>22</sup> The resulting estimates of the value of shelter were revalued in prices of 1840 using the Brady rent deflator extrapolated back to 1800 on the change in the Towne and Rasmussen deflator for the gross rental value of farm dwellings.<sup>23</sup>

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<sup>20</sup> The distribution of values was reported in Lee Soltow, (1989, table 10)

<sup>21</sup> According to Gallman (worksheets underlying his capital stock estimates, pp. 16-17), Raymond Goldsmith thought that in 1805, slave families were on average the same size as free families (5.73 persons). Fogel and Engerman put the average number of slaves per house on large plantations at 5.2 in 1860

<sup>22</sup> The value of dwellings is based on Gallman's work. Gallman never published his estimates of the dwelling stock, so we reconstructed the underlying series by following the procedures he specified in "Gross National Product," p.63. In essence we valued the farm and nonfarm stock of dwellings estimated by Gottlieb (1964, pp. 36-62, esp. Tables 9 and 13) by a price per unit taken from Goldsmith (1952, p. 318). Those figures, which were originally estimated in prices of 1860, were then revalued in the prices of 1840, using a rent index provided to Gallman by Dorothy Brady (the values are reported in Gallman and Weiss, 1969, p. 292, Table 3).

<sup>23</sup> Towne and Rasmussen, "Farm Gross Product and Gross Investment in the Nineteenth Century," in *Studies in Income and Wealth*, (Princeton University Press, 1960) vol. 24, Table 1, p. 267. They used 1900-14 as a base. We shifted the index to a base of 1840 by the simple expedient of using the relative values of their deflator for 1800 to that for 1840, arriving at a value for the 1800 deflator of 74.

### *NonAgricultural Output*

Nonagricultural output is the residual difference between the estimated total GDP and the estimates of all the other components. The residual comprises a slightly larger share of the Middle Atlantic region's total output (50 percent) than it does for the U.S. as a whole (46 percent). This reflects the somewhat greater importance of the urban population and concomitant production of manufactured goods and services in the region's GDP, and conversely the greater importance of agricultural exports in other regions, viz. the Chesapeake and Lower South, which would raise the importance of agriculture vis-à-vis manufacturing for the U.S. as a whole. This residual encompasses all nonagricultural output, except shelter. In other words it includes the output of manufacturing, mining, construction, and final services flowing to consumers other than shelter, as well as the value of government services.

### *Population and Labor Force Estimates for 1790 and 1800*

For 1790 and 1800, data on the white and black populations are reported in the U.S. Census for each of the states in the Mid Atlantic. These figures are shown in Tables A-5 and A-6, along with the labor force estimates for those two years.

## II. Estimates for Years Before 1800

### *Population Estimates*

Figures for the total, white/free, and slave/black population by colony and state for 1700-1800 and the sources are shown in Table A-6.<sup>24</sup> Data on the male shares of the white and black population (Table A-7) and on the shares of the population aged 10 and over by sex (Table A-8) are available for New York and New Jersey at various dates before 1790. For 1790 and 1800, data on the age and sex of the white and black populations are available for each of the states in the Mid Atlantic from the U.S. Census. The shares for the region at the dates covered by one or more of the colonial censuses were estimated as either a weighted average of the shares for the given year and surrounding years in the other colony or were extrapolated on the change in the New York share. The specific method used in each case is noted in Tables A-7 and A-8

The sex and age shares at the benchmark dates for which the total population figures for the region are available were estimated by interpolation between the regional share figures shown in Tables A-7 and A-8. Those benchmark shares were then used to estimate the numbers of males and females, and the number of males and females aged 10 and over for 1700 to 1780. These share estimators and the resulting estimates of population figures by age and sex are shown in Table A-9. The population figures for ages 10 and over were then used to estimate the labor force for the period 1700 to 1790. The figures for 1800 were taken from Weiss's earlier work ("U.S. Labor Force," Appendix Table N and underlying worksheets).

### *Estimates of the Labor Force and Agricultural Labor Force*

The labor force in each year is the sum of estimates of the labor force for white males, white females, black males and black females. Each of those components is the product of the population aged 10 and over and the labor force participation rate for that age-sex group. The participation rates were those for 1800 taken from Weiss's earlier estimates of the labor force. The total labor force figures are shown in Table A-10.

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<sup>24</sup> For purposes of estimating some of the components of the conjectural estimating equation it was necessary for us to estimate the population for years between these benchmark dates. We estimated annual figures for the white and the black populations in each colony by assuming an equal annual growth between each benchmark figure for each population group in each colony.

The agricultural labor force is the sum of estimates for the white and black workers residing in rural areas, plus an estimate of the small numbers of the population in farming that were residing in cities. For each of the two rural population groups, the agricultural labor force is the product of the rural population in that group times a rural agricultural participation rate. We made four estimates of the agricultural labor force, the differences among them arising from alternative assumptions about the trend in the rural agricultural participation rate and in the share of the urban labor force engaged in agricultural. Two estimates were based on Weiss's earlier estimates of the U.S. labor force for 1800 to 1860; in one the rural agricultural ratios was assumed to change over the period 1700 to 1800 at the same rate as it did for the free labor force aged 10 and over in the period 1800 to 1840, i.e. 0.131 percent per year; the other allowed the ratio to change at a faster rate, namely that for free males aged 16 and over in the period 1800 to 1840 (0.198 percent per year). The third, which is the one used in our final estimates, is based on the evidence for Chester county, Pennsylvania for years before 1790.<sup>25</sup>

For the urban share engaged in agriculture we tried two alternatives; one assumed the share remained constant, the other assumed that the urban share declined over time. In our final estimates, the urban farm labor force was assumed to equal one percent of the urban population aged 10 and over, the percentage used by Weiss in his estimates for the nineteenth century. Figures for the Philadelphia workforce presented by Jacob Price suggest the share of the urban population engaged in farming may have been slightly higher in earlier years. His data indicate that farmers, yeoman, etc. comprised 2.7 percent of the city's labor force in 1780-83 and 3.1 percent in 1774, which would equal 1.17 percent of the population aged 10 and over in 1780-83 and 1.36 percent in 1774. Philadelphia may have been more agriculturally-oriented than New York, in which case the one percent figure might be more appropriate for the region as a whole. If we were to allow the farm share of the urban population to change between 1700 and 1770 at the rate implied by the evidence for Philadelphia for 1774 and 1780-83, the growth of the farm labor force and the changes in the farm share of the labor force are altered only very slightly. (See Table A-11, Var. D). It is worth noting that the farm share of the labor forces rises before

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<sup>25</sup> Ball and Walton's (1976, Table 3 p. 109-113) indexes of labor inputs per farm for Chester county from 1714-31 to 1775-90 appear to have assumed there was no decline in the rural agricultural participation rates, except for children. The rate of 0.07 percent that we use is a weighted average of the decline in the child participation rate and constancy in the rate for adults implicit in their estimates.

1730 in all variants, and up 1740 in variants A and B, because the urban share of the population declined until 1740, and noticeably so before 1730.

### *Estimation of Agricultural Output*

No time series of the region's agricultural output is available for the eighteenth century, but we were able to construct one in fairly direct fashion. The output of the agricultural sector is comprised of food that was produced within the region for consumption within the region ( $f$ ), and those agricultural products that were exported either abroad ( $x_a$ ) or to other colonies ( $x_o$ ).<sup>26</sup>

$$O_A = f + x_a + x_o$$

Further, food produced within the region for consumption there ( $f$ ) is equal to food consumed in the region ( $f_c$ ) less the import of food from abroad ( $f_m$ ) or other colonies ( $f_o$ ). In other words,

$$f = f_c - f_o - f_m$$

So, the estimating equation becomes:

$$O_A = f_c - f_o - f_m + x_a + x_o$$

We have compiled a new and more complete time series on agricultural exports from the region to foreign markets. These new estimates of total exports and the distribution between agriculture and nonagriculture ( $x_a$ ) are summarized in Table A-12. The estimation of total exports can be found in an earlier paper and the separate appendix to that paper.<sup>27</sup> The distribution of exports between agricultural and nonagricultural was obtained as follows.

For New York and Pennsylvania we calculated separately the value of agricultural exports in the base years (1768-1772) from each colony to each destination by multiplying export values of enumerated products by an agricultural share factor. Wheat and Indian Corn were taken to be entirely agricultural, while iron and other non-agricultural products were

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<sup>26</sup> We treat all this agricultural output as though it were marketed in order to place a value on it and to make our estimates comparable in scope to those for the early part of the nineteenth century. Nevertheless, we have not made explicit estimates of the value of home manufacturing and farm improvements. We have not excluded these items because they were unimportant, but rather because they were likely more important in 1720 than in 1770 or 1800. Their inclusion would raise the level of GDP in all years, but more so in 1720, and would thus bias downward the estimated rate of economic growth.

<sup>27</sup> See Mancall, Rosenbloom and Weiss, (2013) "Exports from the Colonies and States of The Middle Atlantic Region 1720-1800," and the Appendix to that paper.

assumed to be entirely nonagricultural. For other agricultural exports, the portion agricultural was taken to be equal to the share of raw materials in total value of those agricultural products.

Data on raw material shares were drawn from the 1860 census of manufactures and are based on production in New York, New Jersey and Pennsylvania. For Bread and Flour we used the ratio for Flour and Meal (on the assumption that bread is a small portion of total exports in this category), for beef and pork we used Provisions, Beef and Pork.

We then inflated the agricultural exports to each destination by the ratio of total to enumerated exports for that destination to get the total value of agricultural exports from each colony to each destination. Summing these figures across destinations produces a total value of agricultural exports from the respective colonies over the base years 1768-72. We divided this by 5 to get an average annual value of agricultural exports.

To calculate values for earlier years we extrapolated using data on tonnage clearing and the constant value in sterling of exports to Britain. For each colony we first constructed a constant sterling export series as follows.

- calculate shares of tonnage to each destination in years when this is known
- interpolate years with missing data
- calculate relative value per ton for each destination relative to Britain in the base years
- then calculate constant sterling value of agricultural exports as the value per ton to Britain in that year times the relative value per ton to each destination times the share of agricultural exports to that destination.
- sum these values to get a total for each year
- convert this to an index relative to 1768-1772
- multiply the index by the average annual value of agricultural exports

Based on these calculations, agricultural exports made up a fairly constant 65 percent share of total exports. We used that share to estimate agricultural exports for the period 1791 to 1800.

### *Estimates of Exports to and Food Imports from other colonies for the Colonial Period*

Benchmark values of coastal trade for 1768-72 are based on data reported in Shepherd and Williamson (1972) who provide a table of average annual values (in pounds sterling) of individual commodities imported and exported in coastal trade for each colony. Quantity data are imputed from these values by dividing the average annual values of exports and imports by



unit prices for the vast majority of the listed items; 99 percent of exports and 87 percent of the imports, including all of the food items. We then re-priced these items using dollar prices of 1840, and inflated the resulting values (in 1840 prices) by dividing it by the share these priced items comprised of the value of exports and imports (in pound sterling) in the original data. We made estimates as well of agricultural exports and imports by following the same procedure, but limiting the calculation to agricultural items. These base year values are shown in Table A-13.

#### *Extrapolation of Coastal Trade Estimates to 1715*

The base year values were then extrapolated using data on tonnage entering and clearing Philadelphia and New York. We first calculated average value per ton of exports and imports, and of agricultural exports and imports by dividing the base year values by the average tonnage in the years 1768-1772. (See Table A-13) We then multiplied these average values per ton by tonnage in each year for which the tonnage data were available for New York and Pennsylvania. The region's totals were obtained by inflating the sum for these two colonies by dividing by their shares of regional exports and imports in 1768-1772, which were 99 percent for exports and 97 for imports. This procedure did not yield export and import values for every year, but provided enough annual values to enable us to calculate average "benchmark" values for 10 year periods (except for the period 1855-64) centered on the beginning year of each decade. These benchmark values and per capita values derived from them are shown in Table A-14. Also shown there is the value extrapolated to 1790-92, which was discussed above in the derivation of the values of coastal trade for 1800.

### *Food Imports from Abroad 1720 to 1790-92*

Estimates of food imports from abroad for the years before 1768-72 and for 1790-92 were derived by extrapolating the benchmark data for 1768-72 (described above in the section on the base year estimates) on changes in tonnage and vessels entering New York and Philadelphia. We estimated food imported to these two ports from 3 points of origin - Britain, Europe, and the West Indies (Bahamas, Bermuda and Caribbean). We assumed food per ton entering from each point of origin remained constant over time and multiplied by tonnage entering to calculate food imported for those years for which tonnage data were available. Although we could not do this for all years, we were able to calculate food imports in this way back to 1726 for New York and 1720 for Philadelphia. To derive estimates for years between benchmark dates for each point of origin, we interpolated both average tonnage per vessel entered and numbers of vessels entering for New York and Philadelphia, then multiplied those two figures to calculate tonnage entering each port from each origin. The estimates for each port are shown in Tables A-15 and A-16.

The estimates for each port were combined to get the regional figures. Because the food per ton figures for these two ports covers the region's total imports of food there is no need to inflate the figures to get a regional total in those years for which we have estimates for both ports. For 1720 to 1725, the regional figures were obtained by inflating the Philadelphia figure by that port's average share of the region's total food imports for 1726-31 (around 40 percent). The annual estimates for the region are shown in Table A-17. We also show there 5 year averages, which are the values used in estimating agricultural output.

### *The Value of Food Consumed*

The key component of agricultural output is that for food produced for consumption within the region (f). We estimated this quantity by noting that food produced for consumption within the region equals the value of food consumed minus the quantity of food imported into the region from abroad as well as from other North American colonies. Although there is no time-series evidence on consumption, there is enough information about the diets of colonists and slaves to permit a reasonable approximation of the likely value of food consumed.

Previous work on the value of food consumption in this era has relied largely on poor-house records documenting the quantity or value of provisions provided to the poor, and on

colonial records of provision for troops at various dates.<sup>28</sup> The poor-house records, while valuable in their own right, have not yielded useful information regarding the trend in consumption. A report for 1800-01 from Philadelphia shows a figure of \$30.50 per person on relief. In light of our estimate that per capita food consumption in the region in 1800 was \$30.85 this seems very high for low-income persons.<sup>29</sup> Even if we could rationalize such a high value for the poor in 1800, we have been unable to find comparable budgets for the poor at other dates that would allow us to gauge the rate of change, if any, in the per capita figures. One piece of evidence on the operation of Pennsylvania's poor law in 1709 indicates that fourteen regular clients on outdoor relief received on average 10.7 Pounds Sterling per person per year, or \$55.50 in prices of 1840.<sup>30</sup> Such a figure implies a very large decrease in the value of the diet over time. On the other hand, Billy Smith put the value of a Philadelphia Laborer's diet around 1772 at 10.8 Pounds Pennsylvania currency, or \$18 in prices of 1840, a value much lower than both our 1800 estimate or the figure for 1709.<sup>31</sup>

Somewhat more information can be obtained from data on the provision of troops in New York and Pennsylvania. Figure 1 plots the time series of observations we have been able to assemble on expenditures for militia provisions in the two colonies. There is considerable variation in this series, but no clear evidence of an upward trend.

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<sup>28</sup> Gallman (1971, pp. 71-78) argued that the militia were ordinary members of society serving in the military for a temporary period of time, so military rations seem like a reasonable proxy for food consumption by the colonists.

<sup>29</sup> "Philadelphia Guardians for the Relief and Employment of the Poor of the City of Philadelphia," *The Accounts of the Guardians of the Poor*, reprinted in *Poulson's American Advertiser*, May 19, 1802. If we eliminated molasses and sugar, two items on which an inordinate amount was spent – more than \$5.00 per person – the value would be a more believable \$25.14. Moreover, these items were purchased at retail or wholesale prices while the 1800 figure we constructed was valued at farm prices because we are ultimately interested in the value of farm production. If the distribution margin were 20 percent, the approximate retail margin for grocery stores in the latter half of the 19<sup>th</sup> century, then the Guardian account figure, excluding molasses and sugar, yields a value of around \$20 at farm prices. Carter, et al., 2006. *Historical Statistics of the United States*, Series De249-50.

<sup>30</sup> Peter J. Parker, "Rich and Poor in Philadelphia," *Pennsylvania Magazine of History and Biography*, 1975, p. 5.

<sup>31</sup> Billy Smith, "The Material Lives of Laboring Philadelphians, 1750 to 1800," *William and Mary Quarterly* 3<sup>rd</sup> ser., 38, no. 2 (Apr. 1981), p. 170. Based on purchases by the Pennsylvania Hospital, he estimated the quantities of nineteen food items that made up the worker's diet in 1772. He valued them in prices of 1762 to obtain a weekly amount of 46.7 Pence in Pennsylvania currency, which would amount to 10.8 Pounds per year in Pennsylvania currency. We recalculated his proposed diet in the prices of 1840 and obtained a value of \$18.

The so-called Rules for Georgia specify in some detail the provisions to be provided to persons on charity who were transported to that colony in the 1730s.<sup>32</sup> Although this information on the diet pertains explicitly to colonists in Georgia, it nevertheless provides a point of reference for free colonists elsewhere. The specified diet included beef or pork, rice, peas, flour, beer, molasses, cheese, butter, spice, sugar, vinegar, and salt. Moreover, quantities of each category of provisions were specified for adult males, adult females, children, and servants. In prices of 1840 we have calculated that the provisions for an adult male would have been valued at \$31.<sup>33</sup> Taking account of the lower amounts specified for women and children, a weighted average value of the diet of free colonists would have been only \$24. Since this figure reflects the value of food consumed by those on charity in a newly settled colony we have taken it as a lower bound on the value of per capita food consumption for the more developed Mid-Atlantic region in the 1730s. Moreover, this is roughly equivalent to the value of the diet consumed by slaves in 1800, suggesting too that it is a lower bound for the value of the free colonists' diet.

Although the foregoing observations are inadequate to construct a detailed history of food production we believe they are sufficient to place reasonable bounds on the rate of growth of the diet in the region. The diet surely had its ups and downs with the state of the harvest and with the booms and busts of the economy, but the underlying trend value is our interest, so being able to set bounds on any trend is useful for generating estimates of agricultural output and GDP.

The lower bound for the trend would seem to be no growth in the value of the diet, and there are three arguments in support of this. First, there is no evidence that the value of the diet declined over time, so no growth would seem to be the lower bound on the growth in the diet.<sup>34</sup> Second, as described above, data on military rations indicate that the value of provisions provided to soldiers stayed roughly constant. Third, data on the wages of working class laborers

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<sup>32</sup> Allen D. Candler, 1904-16. *The Colonial Records of the State of Georgia*. Compilations of transcripts of records in the Public Record Office begun by Allen D. Candler and completed by William J. Northen and Lucian Lamar Knight, 1904-16, vol. 3, 408-09.

<sup>33</sup> The diet for women and children aged 12 and over was calculated to be 83 percent that of a male; that for children aged seven to twelve was specified as half that for those aged 12 and over; and that for those aged two to seven was one-third. Apparently no provisions were provided for those under two years of age (Candler 1904-16, vol. 3, pp. 408-09).

<sup>34</sup> Of course, if one accepted the implausibly high estimate of the value of the diet for the poor in 1709, then one would think that the value of the diet declined over time.

in Philadelphia collected by Gary Nash and Billy Smith reveal that although there were short run fluctuations in earnings there was likely no long-term change in the standard of living for working class laborers in Philadelphia. According to Nash's evidence real wages of laborers rose sharply between 1727 and 1733, but fell thereafter and by 1750 the real wage equaled the average for 1727-28.<sup>35</sup> Smith's evidence shows that real wages of laborers fluctuated without trend in the 1750s and 1760s, fell to a low in the 1780s and then recovered.<sup>36</sup> So real wages may have fallen somewhat during the colonial period, but were roughly equal in the late 1720s and 1800.<sup>37</sup>

An upper bound on growth in the value of the diet can be calculated by taking the value of the diet prescribed in the Rules for Georgia (\$24) as the lower bound value of the diet in 1730. Using this as the value of the diet in 1730 implies that the value of food consumed would have had to increase at a rate of 0.37 percent per year in order to reach the diet's actual value of \$30.85 in the base year of 1800 (see Table A-1). This rate of growth seems implausibly high because it rests on such a low initial value of the diet, a value about equal to that for a slave in 1800. It is difficult to believe that the Mid-Atlantic region would have exerted such a strong attraction for settlers if the average colonist in the 1720s and 1730s consumed a diet no better than that consumed by slaves in 1800. Consequently we believe a more realistic upper bound on the growth rate of the value of food consumed per capita is probably closer to 0.2 per cent per year on average. Using a 0.2 percent rate to extrapolate back from the 1800 value of the diet implies that in 1720 food consumption per capita would have been about \$26, still only about 11 percent above the value of the slave diet in 1800.

Consequently we can be confident that the growth rate of the value of the diet between 1720 and 1800 lies somewhere between 0% and 0.2% percent per year, and our most likely

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<sup>35</sup> Gary B. Nash, *The Urban Crucible: Social Change, Political Consciousness, and the Origins of the American Revolution*. Cambridge, MA: Harvard University Press, 1979. Pages 392-94. We extended Billy G. Smith's cost of living index back to 1727 in order to deflate the nominal wages reported by Nash.

<sup>36</sup> Billy G. Smith, "The Material Lives of Laboring Philadelphians, 1750 to 1800." *William and Mary Quarterly*, 3<sup>rd</sup> ser., 38, no. 2 (April 1981), pp. 164-202. The wage data are on pages 184-85, the cost of living indices on p. 173.

<sup>37</sup> The 1800 figure was lower than that of 1727-28, but the average for 1798-1800 was about the same as that for 1727-28

estimate is the midpoint of this range—0.1% per year.<sup>38</sup> The plausibility of our assumption about the rate of growth in the value of the diet is reinforced by evidence on the growth of agricultural labor productivity.

### *Output per Worker in Agriculture*

If we combine these estimates of agricultural output we can calculate average agricultural output per worker at our benchmark dates and assess those figures by comparing them to other estimates. That other evidence on labor productivity growth in the nineteenth century, in Chester county Pennsylvania in the eighteenth century, and for indentured servants, lends credence to the growth rate of agricultural labor productivity implied by our assumption of a 0.1% rate of growth of the value of the diet, and perhaps more strongly argues against any more rapid improvement in the diet.

The performance of agriculture in the early nineteenth century sets upper bounds on the growth of output per worker over long periods in the eighteenth. According to Duane Ball and Gary Walton, “Because of slower rates of technological progress in eighteenth century agriculture,...it is reasonable to expect the eighteenth century experience to mirror more closely the lower 1800-1850 rate than the much higher rate for 1850-1900.”<sup>39</sup> There could be a decade every now and then in which there was an upsurge in output per worker, but over an extended period of time the growth in output per worker in the eighteenth century could not have exceeded the average increase over long periods in the nineteenth century.

The rates of growth of agricultural output per worker implied by our assumed rate of growth in the diet of 0.1 percent per year and several alternative rates are shown in Table A-18. Comparable evidence for the nineteenth century suggests how plausible or implausible these rates are. The nineteenth century’s rates of growth pertinent for comparison are as follows:

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<sup>38</sup> We have also had to make an assumption about the change in the slave diet over time, but because slaves were relatively unimportant in the region, averaging less than 7 percent of the population for the entire period and dwindling in importance over time, this has little bearing on the growth of GDP per capita for the entire population.

<sup>39</sup> Ball and Walton (1976, p. 103) were talking about total factor productivity, but the argument would seem to apply as well to labor productivity. The nineteenth century would also seem to have benefited from the greater possibility of economies of scale, as well as improvements in seeds and animal husbandry.

Rates of Growth of Agricultural Output per Worker <sup>40</sup>

1800 to 1840	0.34
1800 to 1850	0.25
1800 to 1860	0.58

As seen in Table A-18, if the diet had increased at 0.37 percent per year, agricultural output per worker would have increased at 0.44 percent per year from 1720 to 1770 and 0.50 percent from 1720 to 1800, as fast or faster than the rate for the first half of the nineteenth century. Even more striking is that the growth of output per worker in the first 3 decades of our study would have been twice the rates of advance over the period 1800 to 1850. When the diet is assumed to have grown at only 0.2 percent per year, a less compelling argument can be made that the rates of growth of output per worker are implausible, but the rate for 1720 to 1800 is slightly faster than that for the first half of the nineteenth century. And, when this evidence is combined with the implicit value of the free colonist's diet being only marginally above that of a slave, growth in the diet of 0.2 percent per year seems too fast. Our assumption, that the diet rose at 0.1 percent per year, implies that output per worker rose at 0.19 between 1720 and 1770 and 0.25 percent between 1720 and 1800, both of which rates are below any of the nineteenth century standards, and seem much more plausible than the alternatives.<sup>41</sup>

The rates of growth of output per worker can also be compared to those estimated for Chester county, Pennsylvania by Ball and Walton, and by Menard. Ball and Walton used probate data to calculate indexes of inputs and outputs on farms in four periods across the 18<sup>th</sup> century.<sup>42</sup> They focused on the change in TFP, but their indexes also show that output per labor input increased at an annual rate of 0.37 percent between 1714-31 and 1750-70. The increase was due largely to a decline in the labor index from a value of 100 in 1714-31 to 91.1 in 1750-70, whereas the output index rose from 100 to only 105. Russell Menard thought that their labor index declined too rapidly and offered an alternative series that rose from 100 to 109, and

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<sup>40</sup> Weiss, 1992, Table 6 and the underlying work sheets.

<sup>41</sup> Of course, the rates based on no growth in the diet are even lower, and more plausible by this criterion.

<sup>42</sup> Duane Ball and Gary Walton, (1976, Table 3 p. 109-113). The time period covered by Ball and Walton (1714-31 to 1775-90) differs from ours (1720 to 1800), but we can construct shorter time periods in our series that are very similar to those in Ball and Walton, such as 1720-40 for comparison with their period of 1714-31 to 1734-45.

yielded a decline in productivity at a rate of minus 0.1 percent per year.<sup>43</sup> Our estimate that output per worker increased at 0.19 percent per year over the roughly comparable time period, 1720 to 1760, falls soundly in the range of rates set by Ball and Walton at the upper end and Menard at the lower end. The same holds for two twenty-year time periods for which we can make comparisons with our estimates, the rates of change in our series fall roughly in the middle of the range set by their alternative estimates. Our long term period of 1720 to 1800 does not cover exactly the same time period as theirs, but nevertheless our estimated rate of change in output per worker of 0.25 is very close to the rate of 0.19 found by Ball and Walton for the period running from 1714-31 to 1775-90.<sup>44</sup>

Finally, our estimated productivity growth is in line with the productivity growth implied by changes in the length of indentured servant contracts, the modal value of which suggests little if any gain before 1760 and some increase in servant value after 1770.<sup>45</sup> Overall, we think these comparisons indicate that our implied rates of growth of output per worker are very reasonable and lend credence to our estimates of agricultural output.

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<sup>43</sup> Russell Menard, "Comment on Paper by Ball and Walton," *The Journal of Economic History* 36, 118-25.

<sup>44</sup> The growth of agricultural output per worker in the region over this long term also compares favorably with our estimate for the Lower South. For that region we estimated that output per worker rose at 0.22 percent per year from 1720 to 1800. Mancall, Rosenbloom and Weiss, 2003, p. 403.

<sup>45</sup> Grubb, (1992) "The Long-Run Trend," pp. 181-82 and 202-25. He argues that the mode is the superior measure of changes in the contract length and the value of adult servants because the mean values were influenced by yearly fluctuations in the age structure of emigrant servants.



Appendix Table A-1									
Estimates of GDP and Components in the Base Year of 1800: U.S. and Middle Atlantic Region									
(U.S. dollars, prices of 1840)									
United States			Mid Atlantic		Mid Atlantic		Ratio of		
Non-Indian Population			Non-Indian Population		per capita values				
Totals	Per Capita		Totals	Per Capita	Per Capita Values		Mid Atlantic	Shares of GDP	
\$000's	\$s		\$000's	\$s	Free Pop.	Slaves	to U.S.	US	Region
Agricultural Output	167,772	31.61	47,712	32.56			1.03	0.48	0.42
Food Production	149,966	28.26	37,615	25.67			0.91	0.43	0.33
<i>Food (consumption)</i>	159,098	29.98	45,206	30.85	31.07	23.30	1.03	0.45	0.39
<i>less interstate food imports</i>	-	-	4,337	2.96				-	0.04
<i>less food imports from abroad</i>	9,132	1.72	3,253	2.22			1.29	0.03	0.03
Agric Exports Abroad	17,806	3.36	5,539	3.78			1.13	0.05	0.05
Agr. Exports to Other Colonies	-	-	4,557	3.11				-	0.04
Shelter	20,381	3.84	9,281	6.33	6.49	0.97	1.65	0.06	0.08
Non-Shelter NonAgr. Output	163,369	30.78	57,580	39.29			1.28	0.46	0.50
Invisible Earnings			2,769	1.89					0.02
NonAgric Exports				2.04					0.03
Firewood	35,258	6.64	10,942	7.47	7.57	3.79	1.12	0.10	0.10
Other NonAgric Output	128,111	24.14	43,868	27.90			1.16	0.36	0.36
GDP (Narrowly Defined)	351,522	66.24	114,573	78.19	79.62	28.05	1.18	1.00	1.00
									Share of LF
Labor Force	1713.2		402						
Agricultural	1262.2		281					74%	70%
NonAgricultural	451.0		121					26%	30%
<i>Output per worker (Narrowly Defined)</i>									
Agricultural	133		170				1.28		
NonAgricultural (EXCL Shelter)	362		476				1.31		
Ratio NonAgr. To Agr.	2.73		2.80				1.03		

Sources: See discussion in the text for an explanation of the estimates. Food Production refers to food produced for consumption within the nation or region, not the total production of food which would include exports of food items. The preponderance of agricultural exports was food items.

Table A-2													
Conjectural Estimation of GDP per Capita for the Mid Atlantic, 1800-1840													
Input Indexes for the Region			Estimate of				Mid Atlantic	US	Mid Atlantic				
LF	output	Intersectoral	GDP per capita		Mid Atlantic	US	LF	Agric.	Intersectoral	Mid Atlantic			
Part.	per	Shift	Extrapolated	Relative	GDP per	Part.	O/W	Shift	Value of K	Agriculture			
Rate	worker	Effect	Value of	to U.S.	Capita	Rate	Index	Effect	(Easterlin)	of LF			
			Index										
1800	0.91	0.87	0.90	0.72	78.10	1.18	66.03	0.275	87.2	1.32	2.05	0.69	
1810	0.90	0.89	0.93	0.74	81.30	1.17	69.28	0.271	89.4	1.36	2.05	0.65	
1820	0.92	0.90	0.95	0.79	86.11	1.20	71.65	0.278	90.2	1.39	2.05	0.63	
1830	0.96	0.94	0.97	0.87	95.39	1.21	78.84	0.289	93.8	1.43	2.05	0.59	
1840	1.00	1.00	1.00	1.00	\$ 109.13	1.20	90.71	0.302	100.0	1.47	2.05	0.55	
<i>Average Annual Rates of Change</i>													
1800-40	0.232	0.342	0.263	0.840	0.840	0.043	0.797	0.232	0.342	0.263	0.000	-0.561	
1800-10	-0.154	0.249	0.308	0.403	0.403	-0.078	0.482	-0.154	0.249	0.308	0.000	-0.582	
1810-20	0.274	0.083	0.217	0.575	0.575	0.238	0.337	0.274	0.083	0.217	0.000	-0.444	
1820-30	0.378	0.399	0.249	1.029	1.029	0.068	0.961	0.378	0.399	0.249	0.000	-0.548	
1830-40	0.433	0.637	0.279	1.355	1.355	-0.057	1.413	0.433	0.637	0.279	0.000	-0.668	

Notes and Sources for Table A-2: The GDP figures for the Mid Atlantic region 1800-1830 (col. 5) were derived by extrapolating backward the region's GDP per capita for 1840. The extrapolating index (col. 4) is the product of the indexes for the region's labor force participation rate (col. 1), agricultural output per worker (col. 2), and the intersectoral shift effect (col.3). The region's labor force participation rate (col. 8) and the agricultural share of the region's labor force (col. 12) are from worksheets underlying Weiss, 1992. The region's agricultural output per worker was assumed to have changed at the same rate as that for the U.S. The U.S. series on agricultural output per worker is from Weiss, 1992, Table 6. The intersectoral shift effect equals  $S_a + kS_n$ , where  $S_a$  and  $S_n$  are the labor force shares in farm and nonfarm industries, and  $k$  is the ratio of nonfarm to farm output per worker. The 1840 value of  $k$  is from Easterlin (1960) and was assumed to have remained constant over time.

<b>Table A-3: Estimation of Food Imports for 1768-72</b>		
A: Average Annual Value of Total Imports		
	Pounds (£) sterling (constant value)	
from:	Middle Colonies	All Colonies
England And Scotland	822,258	2,828,898
Southern Europe and Wine Is.	32,400	77,200
West Indies	254,400	781,400
Total of the Above		
B: Average Annual Value of Food Imports		
England And Scotland	25,813	88,808
Southern Europe and Wine Is.	32,400	77,200
West Indies	221,328	679,818
Total of the Above	279,541	845,826
Food Share	25 %	23 %
1770 Population	555,904	2,165,076
C: Per Capita Values of Food Imports		
England And Scotland	0.05	0.04
Southern Europe and Wine Is.	0.06	0.04
West Indies	0.40	0.31
Total	0.50	0.39
Per capita values of Food Imports in US Dollars, prices of 1840		
Exchange Rate	\$ 4.44	4.44
Total in 1768-72 prices	2.23	1.73
Price Index 1840=100	1.45	1.45
Per capita value in \$s, prices of 1840	1.54	1.19

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Sources: Total imports are from Susan Carter, et al., *Historical Statistics*, Series Eg452-455; Data for food imports from Southern Europe, the Wine Islands, and the West Indies are from James Shepherd, 1970 "Commodity Imports" Tables 1 and 2. The food share of imports from England and Scotland was taken to be 3 percent, (see S.D. Smith, 1995. "Prices and the Value of English Exports," Table 5).

Table A-4 Rental Value of Dwellings  
Average Value of Dwellings  
(valued in 1798 prices)

	Average Value of Dwellings (valued in 1798 prices)			Annual Rental Value (1840 prices)		
	for the Total Population	for Slaves	for Free Persons	per Person	per Slave	per Free Person
Delaware	35.15	5.38	38.30	4.74	0.73	5.17
New Jersey	46.16	7.06	48.59	6.23	0.95	6.55
New York	45.27	6.93	46.65	6.11	0.93	6.29
Pennsylvania	50.14	7.67	50.26	6.76	1.03	6.78
Mid Atlantic	46.96	7.18	48.10	6.33	0.97	6.49
U.S.	28.47	4.36	33.35	3.84	0.59	4.50

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Sources: See text for sources and details of the estimation. The rental value equals the average value of dwellings per person times an annual rental rate, with that value then converted to an 1840 price base using the deflator for the gross rental value of farm dwellings constructed by Towne and Rasmussen (1960, Table 1). We shifted their price index from a base of 1910-14 to a base of 1840.

Table A-5  
Population by Selected Characteristics, 1790 and 1800

	Total	Free	Slave	Urban	Rural
<b>1790</b>					
Delaware	59,096	50,209	8,887	-	59,096
New Jersey	184,139	172,716	11,423	-	184,139
New York	340,241	319,048	21,193	39,213	301,028
Pennsylvania	433,611	429,904	3,707	44,096	389,515
Middle Colonies	1,017,087	971,877	45,210	83,309	933,778
<b>1800</b>					
Delaware	64,273	58,120	6,153	-	64,273
New Jersey	211,949	199,527	12,422	-	211,949
New York	586,756	566,413	20,343	74,757	511,999
Pennsylvania	602,361	600,655	1,706	68,354	534,011
Middle Colonies	1,465,339	1,424,715	40,624	143,111	1,322,232

**Labor Force aged ten and over by Category**

	Total	Free	Slave	Agricultural Labor force
1790	290,508	262,686	27,822	212,907
1800	401,959	377,836	24,123	280,950

**Notes and Sources to Table A-5**

The 1800 population figures are those underlying Weiss's earlier estimates of the labor force for that year; the 1790 population figures are from Carter, et al, *Historical Statistics of the United States*, Series Aa.

The 1800 labor force figures were taken from Weiss ("U.S. Labor Force," Appendix Table N and underlying worksheets). The participation rates underlying those 1800 figures for each of four population groups - white males, white females, black males and black females - were used to estimate the total labor force in 1790. The agricultural labor force is the sum of estimates for the white and black workers residing in rural areas, plus an estimate of the small numbers of the population in farming that were residing in cities. The figures for 1800 constructed in this fashion were taken from Weiss (*ibid*), and the underlying ratios of agricultural workers in the various population groups were used to estimate the agricultural labor force in 1790 and earlier years.

<b>Table A-6</b>					
Population by Colony and State, 1700 to 1800					
Year	Delaware	New Jersey	New York	Pennsylvania	Region
<b>Panel A: Total Population</b>					
1700	2,470	14,010	19,107	17,950	53,537
1710	3,645	19,872	21,625	24,450	69,592
1720	5,385	29,818	36,919	30,962	103,084
1730	9,170	37,510	48,594	51,707	146,981
1740	19,870	51,373	63,665	85,637	220,545
1750	28,704	71,393	76,696	119,666	296,459
1760	33,250	93,813	117,138	183,703	427,904
1770	35,496	117,431	162,920	240,057	555,904
1780	45,385	139,627	210,541	327,305	722,858
1790	59,096	184,139	340,241	433,611	1,017,087
1800	64,273	211,949	586,756	602,361	1,465,339
<b>Panel B: White Population</b>					
1700	2,335	13,170	16,851	17,520	49,876
1710	3,145	18,540	18,814	22,875	63,374
1720	4,685	27,433	31,179	28,962	92,259
1730	8,692	34,502	41,638	50,466	135,298
1740	18,835	47,007	54,669	83,582	204,093
1750	27,208	66,039	65,682	116,794	275,723
1760	31,517	87,246	100,798	179,294	398,855
1770	33,660	109,211	143,808	234,296	520,975
1780	42,389	129,167	189,487	319,450	680,493
1790	46,310	169,954	314,366	423,373	954,003
1800	49,852	195,125	556,039	586,094	1,387,110
<b>Panel C: Black Population</b>					
1700	135	840	2,256	430	3,661
1710	500	1,332	2,811	1,575	6,218
1720	700	2,385	5,740	2,000	10,825
1730	478	3,008	6,956	1,241	11,683
1740	1,035	4,366	8,996	2,055	16,452
1750	1,496	5,354	11,014	2,872	20,736
1760	1,733	6,567	16,340	4,409	29,049
1770	1,836	8,220	19,112	5,761	34,929
1780	2,996	10,460	21,054	7,855	42,365
1790	12,786	14,185	25,875	10,238	63,084
1800	14,421	16,824	30,717	16,267	78,229

Notes and Sources: 1630-1780 – Susan Carter, et al., Historical Statistics of the United States, 2006, Series Eg: 1- 59; 1790-1800, U.S. Census data, as reported in Susan Carter, et al, Series Aa: 2769-71, 4779-81, 4943-45, and 5407-09.

The total population shown above for New York and Pennsylvania differs from the published figures because of what appears to be a typographical error in the published figures.

Table A-7						
Male Shares of the Population, by Race at Various Census Dates						
Year	Delaware	New Jersey	New York	Penn.	Middle Colonies	Basis for regional estimate
<b>Panel A: White Population</b>						
1703			0.506		0.513	extrapolated on NY share
1723			0.511		0.519	wtd avg 1723&26
1726		0.527			0.513	wtd avg 1723&26
1731			0.503 (a)		0.513	wtd avg 1731&37
1737			0.500		0.510	wtd avg 1737&38
1738		0.522			0.510	wtd avg 1737&38
1745		0.517			0.514	wtd avg 1745&46
1746			0.512		0.514	wtd avg 1745&46
1749			0.516		0.515	wtd avg. 1745,46&49
1756			0.520		0.516	wtd avg. 1746,49&56
1771			0.516		0.517	wtd avg 1771&72
1772		0.521			0.517	wtd avg 1771&72
1786		.515 (b)	0.511		0.513	wtd. avg. of NY&NJ
1790	0.517	0.510	0.516	0.514	0.514	wtd avg-US censusdata
1800	0.502	0.510	0.535	0.514	0.522	wtd avg-US censusdata
1810	0.506	0.508	0.516	0.510	0.513	wtd avg-US censusdata
<b>Panel B: Black Population</b>						
1703			0.520		0.523	extrapolated on NY share
1723			0.545		0.548	wtd avg 1723&26
1726		0.556			0.555	wtd avg 1723, 26 & 31
1731			0.563		0.558	wtd avg 1726, 31&37
1737			0.553		0.554	wtd avg 1737&38
1738		0.555			0.554	wtd avg 1737&38
1745		0.562			0.543	wtd avg 1745&46
1746			0.533		0.543	wtd avg 1745&46
1749			0.538		0.540	extrapolated on NY share
1756			0.559		0.562	extrapolated on NY share
1771			0.535		0.537	wtd avg 1771&72
1772		0.554			0.537	wtd avg 1771&72
1786			0.504		0.516	extrapolated on NY share
1790					0.504	avg. 1786&1800
1800	0.558	0.480	0.480	0.480	0.492	wtd avg-US censusdata
1810	0.558	0.480	0.480	0.481	0.491	wtd avg-US censusdata

Notes and Sources to Table A-7: Data on the age and sex composition are from New Jersey Censuses of 1726, 1738, 1745, and 1772, and the New York Censuses of 1698, 1703, 1723, 1731, 1737, 1746, 1756, 1771, 1786. The data were reported originally in Evarts B. Greene and Virginia D. Harrington, *American Population Before The Federal Census Of 1790* (NY: Columbia University Press, 1932) and were supplied electronically by Michael Haines.

- a. The 1731 figure based on the original census data was way out of line compared to the values for nearby dates. We used instead the data as corrected by Wells, (1973).
- b. The New Jersey value for the white population in 1786 is the average of the values for 1772 and 1790



Table A-8						
Shares of the Population aged 10 and over, by sex						
	Delaware	New Jersey	New York	Penn.	Middle Colonies	Basis for regional estimate
<b>Panel A: Aged 10 and over Shares of the White Male Population</b>						
1703			0.661		0.658	extrapolated on NY share
1723			0.695		0.692	wtd avg 1723&26
1726		0.689			0.692	wtd avg 1723&26
1731			0.657 (a)		0.678	avg 1726, 31, 37 and & 38
1737			0.676		0.683	wtd avg 1737&38
1738		0.691			0.683	wtd avg 1737&38
1745		0.681			0.690	wtd avg 1745&46
1746			0.698		0.690	wtd avg 1745&46
1749			0.703		0.699	extrapolated on NY share
1756			0.703		0.699	extrapolated on NY share
1771			0.734		0.731	extrapolated on NY share
1772					0.731	set equal to 1771
1786			0.690		0.687	extrapolated on NY share
1790			0.696		0.693	extrapolated on NY share
1800	0.670	0.651	0.663	0.658	0.659	wtd avg-US censusdata
1810	0.656	0.672	0.650	0.655	0.655	wtd avg-US censusdata
<b>Panel B: Aged 10 and over Shares of the White Female Population</b>						
1703			0.603		0.613	extrapolated on NY share
1723			0.682		0.692	wtd avg 1723&26
1726		0.673			0.692	wtd avg 1723&26
1731			0.688		0.684	avg 26, 31, 37 and & 38
1737			0.680		0.683	wtd avg 1737&38
1738		0.695			0.683	wtd avg 1737&38
1745		0.661			0.690	wtd avg 1745&46
1746			0.654		0.690	wtd avg 1745&46
1749			0.679		0.670	extrapolated on NY share
1756			0.687		0.677	extrapolated on NY share
1771			0.699		0.689	extrapolated on NY share
1772					0.689	set equal to 1771
1786			0.678		0.669	extrapolated on NY share
1790					0.675	extrapolated on change in male share
1800	0.693	0.659	0.669	0.650	0.660	wtd avg-US censusdata
1810	0.669	0.677	0.645	0.658	0.654	wtd avg-US censusdata

Notes and Sources to Table A-8: See Table A-7

Table A-9								
Age and Sex Composition of the Population in the Region								
Panel A: Male and Female Population in the Region, by Race								
Year	Male Share Estimators		Males	Males	Total	Females	Females	Total
	Blacks	Whites	Black/Slave	White/Free	Males	Black/Slave	White/Free	Females
1700	0.523	0.513	1,915	25,608	27,522	1,746	24,268	26,015
1710	0.532	0.515	3,306	32,652	35,957	2,912	30,722	33,635
1720	0.544	0.518	5,891	47,771	53,662	4,934	44,488	49,422
1730	0.557	0.513	6,512	69,417	75,929	5,171	65,881	71,052
1740	0.551	0.511	9,062	104,293	113,356	7,390	99,800	107,189
1750	0.543	0.515	11,262	141,988	153,250	9,474	133,735	143,209
1760	0.555	0.517	16,129	206,036	222,165	12,920	192,819	205,739
1770	0.539	0.517	18,814	269,465	288,278	16,115	251,510	267,626
1780	0.525	0.515	22,237	350,328	372,565	20,128	330,165	350,293
1790	0.504	0.514	22,786	490,153	512,939	22,424	481,724	504,148
1800	0.492	0.522	19,987	743,091	763,078	20,637	681,624	702,261
Panel B: Males and Females Aged 10+ in the Region, by Race								
	Share Estimators for Ages 10+		Males	Males	Total	Females	Females	Total
	Males	Females	Black/Slave	White/Free	Males	Black/Slave	White/Free	Females
1700	0.658	0.613	1,260	16,851	18,111	1,070	14,868	15,938
1710	0.670	0.639	2,214	21,872	24,086	1,862	19,645	21,508
1720	0.687	0.680	4,047	32,823	36,871	3,354	30,242	33,596
1730	0.681	0.686	4,435	47,278	51,713	3,546	45,177	48,723
1740	0.685	0.685	6,207	71,431	77,638	5,061	68,354	73,415
1750	0.699	0.671	7,877	99,314	107,191	6,358	89,743	96,101
1760	0.708	0.681	11,411	145,777	157,188	8,794	131,235	140,028
1770	0.728	0.688	13,704	196,284	209,988	11,095	173,160	184,255
1780	0.705	0.678	15,679	247,013	262,692	13,639	223,725	237,364
1790	0.693	0.675	15,781	339,465	355,246	15,133	325,082	340,214
1800	0.659	0.660	13,174	489,782	502,955	13,629	450,168	463,797

Notes and Sources to Table A-9: The population estimates are the product of the share estimators and the regional population figures. The male share and Aged 10+ share estimators are from Tables A-7 and A-8; the regional population figures are from Table A-6.

Table A-10			
---- Labor Force Estimates ----			
	Colonists and slaves	Free Whites	Slaves
1700	15,058	12,961	2,097
1710	20,513	16,844	3,669
1720	31,987	25,326	6,661
1730	43,762	36,579	7,183
1740	65,414	55,272	10,141
1750	89,331	76,520	12,811
1760	130,472	112,287	18,185
1770	173,291	150,972	22,319
1780	216,737	190,350	26,386
1790	290,508	262,686	27,822
1800	401,959	377,836	24,123
Average Annual Rates of Change			
1720-1770	3.437	3.635	2.448
1770-1800	2.844	3.105	0.259
1720-1800	3.214	3.436	1.622
1720-1740	3.642	3.979	2.124
1740-1760	3.512	3.607	2.963
1740-1770	3.301	3.406	2.664
1700-1710	3.140	2.655	5.754
1710-1720	4.543	4.162	6.146
1720-1730	3.184	3.745	0.757
1730-1740	4.102	4.214	3.509
1740-1750	3.165	3.306	2.365
1750-1760	3.861	3.910	3.565
1760-1770	2.879	3.005	2.070

See the text for sources and method of estimation.

Table A-11												
Industrial Composition of the Labor force (colonists and slaves aged 10 and over)												
	Variant A			Variant B			Variant C			Variant D		
	Agric.			Agric.			Agric.			Agric.		
	Agric.	NonAgric.	Share	Agric.	NonAgric.	Share	Agric.	NonAgric.	Share	Agric.	NonAgric.	Share
1700	10,503	4,555	0.698	11,160	3,898	0.741	11,928	3,130	0.792	12,085	2,973	0.803
1710	14,558	5,955	0.710	15,375	5,138	0.750	16,325	4,188	0.796	16,481	4,032	0.803
1720	23,175	8,812	0.724	24,328	7,659	0.761	25,660	6,327	0.802	25,831	6,156	0.808
1730	32,433	11,328	0.741	33,842	9,920	0.773	35,459	8,302	0.810	35,618	8,144	0.814
1740	48,903	16,511	0.748	50,719	14,695	0.775	52,790	12,624	0.807	52,945	12,469	0.809
1750	65,383	23,948	0.732	67,401	21,930	0.755	69,687	19,644	0.780	69,830	19,501	0.782
1760	95,813	34,659	0.734	98,172	32,300	0.752	100,828	29,644	0.773	100,951	29,521	0.774
1770	124,051	49,240	0.716	126,334	46,957	0.729	128,888	44,403	0.744	129,005	44,286	0.744
1780	158,436	58,301	0.731	160,375	56,362	0.740	162,531	54,206	0.750	162,584	54,153	0.750
1790	211,617	78,892	0.728	212,907	77,602	0.733	214,332	76,176	0.738	214,378	76,130	0.738
1800	280,950	121,009	0.699	280,950	121,009	0.699	280,950	121,009	0.699	280,950	121,009	0.699
	Average Annual Rates of Change											
1720-1770	3.412	3.501	-0.024	3.349	3.693	-0.085	3.281	3.974	-0.151	3.269	4.025	-0.163
1770-1800	2.762	3.043	-0.080	2.700	3.206	-0.140	2.631	3.398	-0.207	2.628	3.407	-0.210
1720-1800	3.168	3.329	-0.045	3.105	3.510	-0.106	3.037	3.758	-0.172	3.028	3.793	-0.180
1720-1740	3.804	3.189	0.157	3.742	3.312	0.096	3.673	3.514	0.030	3.654	3.592	0.011
1740-1760	3.420	3.777	-0.089	3.357	4.016	-0.150	3.288	4.361	-0.216	3.280	4.403	-0.225
1740-1770	3.152	3.709	-0.144	3.089	3.948	-0.205	3.020	4.282	-0.272	3.013	4.315	-0.278
1700-1710	3.318	2.718	0.173	3.256	2.801	0.113	3.188	2.956	0.046	3.151	3.093	0.011
1710-1720	4.759	3.997	0.207	4.696	4.073	0.146	4.626	4.211	0.080	4.596	4.322	0.051
1720-1730	3.418	2.543	0.227	3.356	2.620	0.167	3.287	2.755	0.100	3.265	2.838	0.078
1730-1740	4.192	3.839	0.087	4.129	4.008	0.026	4.060	4.279	-0.040	4.044	4.352	-0.056
1740-1750	2.947	3.788	-0.212	2.884	4.085	-0.272	2.816	4.521	-0.339	2.807	4.574	-0.347
1750-1760	3.895	3.766	0.033	3.832	3.948	-0.027	3.763	4.201	-0.094	3.754	4.233	-0.102
1760-1770	2.617	3.574	-0.255	2.554	3.813	-0.316	2.486	4.123	-0.382	2.482	4.139	-0.385

Notes and Sources: See text for a fuller discussion. The differences between Variants in the industrial distribution of the labor force reflect differences in the rate of change in the share of the rural labor force in agriculture, and differences in the share of the urban population assumed to be engaged in agriculture. The rural agricultural participation rate was assumed to have changed over time at 0.07 percent per year in Variant A, 0.131 percent per year in Variant B, and at 0.198 percent per year in Variants C and D. The urban share of the population was assumed to remain constant at one percent in both Variants A, B, and C, but assumed to decline over time in Variant D from approximately four percent of the urban population in 1700 to one percent in 1800.

Table A-12  
Domestically Produced Exports at Benchmark Dates

Year	<u>Annual Estimates</u>			<u>Three Year Averages</u>		
	Agricultural	Non-	Total	Agricultural	Non-	Total
		Agricultural			Agricultural	
1720	\$337,592	\$172,288	\$509,880	\$333,172	\$169,102	\$502,274
1730	\$495,538	\$240,374	\$735,912	\$510,600	\$240,058	\$750,658
1740	\$846,531	\$314,924	\$1,161,455	\$842,468	\$315,019	\$1,157,487
1750	\$1,243,840	\$561,554	\$1,805,395	\$1,222,383	\$555,380	\$1,777,763
1760	\$1,371,307	\$687,972	\$2,059,279	\$1,370,234	\$689,264	\$2,059,498
1770	\$2,335,779	\$1,027,426	\$3,363,205	\$2,146,192	\$994,028	\$3,140,220
1780	NA	NA	NA	NA	NA	NA
1791	\$2,193,928	\$1,181,346	\$3,375,274	\$2,184,614	\$1,176,331	\$3,360,945
1800	\$4,490,562	\$2,417,995	\$6,908,556	\$5,545,517	\$2,986,047	\$8,531,564

**Average Rates of Change**

1720-1770	3.94	3.64	3.85	3.80	3.61	3.73
1770-1800	2.20	2.89	2.43	3.21	3.73	3.39
1720-1800	3.29	3.36	3.31	3.58	3.65	3.60
1720-30	3.91	3.39	3.74	4.36	3.57	4.10
1730-40	5.50	2.74	4.67	5.13	2.75	4.43
1740-50	3.92	5.95	4.51	3.79	5.83	4.38
1750-60	0.98	2.05	1.32	1.15	2.18	1.48
1760-70	5.47	4.09	5.03	4.59	3.73	4.31

Source: Mancall, Rosenbloom and Weiss, "Exports from the Colonies and States of The Middle Atlantic Region 1720-1800," and the Appendix to that paper. See the text of this appendix for method of estimating the agricultural-nonagricultural distribution of exports.

**Table A-13**  
**Annual Average Value of Exports to and Imports from Other Colonies, 1768-72**

**Values of Coastal Exports and Imports in Thousands of Pounds Sterling**

Commodity	New York		New Jersey		Pennsylvania		Delaware		Region	
	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
Corn	0.6	1.5	0.1	0.2	0.9	2.3	0	0	1.6	4
Wheat	0.2	4	0	0.2	0	11.5	0	0.2	0.2	15.9
Rice	0.7	4.7	0	0	0.7	6.8	0	0	1.4	11.5
Molasses	2.5	13	0	0.6	1.8	11	0	0	4.3	24.6
Brown sugar	4.8	1.8	0.2	0	1.9	2.7	0	0	6.9	4.5
Bread and Flour	30.8	1.9	1.5	0	73.5	0.3	0	0	105.8	2.2
Dried Fish	0.1	1	0	0	0	1.3	0	0	0.1	2.3
New England Rum	8.1	5	0.1	0.9	7.2	11.5	0	0	15.4	17.4
West Indian Rum	2.4	17.3	0.1	1.1	9.8	5.2	0	0	12.3	23.6
Naval Stores	0.5	2.8	0	0	0.1	3.1	0	0	0.6	5.9
Potash, Pine Boards, Train Oil	0.5	4.1	0.1	0.0	0.2	5.8	0.0	0.0	0.8	9.9
Total : Priced Items	50.2	50.2	2	3	95.8	52.6	0	0.2	148	106
Total of All Items Listed	51.2	57.1	2.1	3	96.1	61.5	0	0.2	149.4	121.8
Ratio: Priced/ Total	0.98	0.88	0.95	1.00	1.00	0.86		1.00	0.99	0.87

**Imputed Quantities of Coastal Exports and Imports of Food**

Corn	5,843	14,607	974	1,948	8,764	22,398			15,581	38,953
Wheat	980	19,590	-	980	-	56,322		980	980	77,872
Rice	352	2,361	-	-	352	3,415		-	703	5,776
Molasses	48,993	254,766	-	11,758	35,275	215,571		-	84,269	482,095
Brown sugar	343,794	128,923	14,325		136,085	193,384		-	494,205	322,307
Bread and Flour	6,467,165	398,949	314,959		15,433,008	62,992			22,215,133	461,940
Dried Fish	199	1,993	-		-	2,591			199	4,584
New England Rum	128,163	79,113	1,582	14,240	113,922	181,960			243,668	275,313
West Indian Rum	23,505	169,435	979	10,773	95,981	50,929			120,466	231,137

**Table A-13 - continued**

Commodity	New York		New Jersey		Pennsylvania		Delaware		Region	
	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
<b>Values of Coastal Exports and Imports in 1840 prices</b>										
Corn	2,766	6,914	461	922	4,148	10,602	-	-	7,375	18,438
Wheat	1,015	20,309	-	1,015	-	58,387	-	1,015	1,015	80,727
Rice	7,143	47,963	-	-	7,143	69,393	-	-	14,287	117,357
Molasses	12,085	62,842	-	2,900	8,701	53,174	-	-	20,786	118,917
Brown sugar	26,578	9,967	1,107	-	10,521	14,950	-	-	38,206	24,917
Bread and Flour	198,730	12,259	9,678	-	474,242	1,936	-	-	682,651	14,195
Dried Fish	492	4,917	-	-	-	6,392	-	-	492	11,309
New England Rum	40,264	24,855	497	4,474	35,791	57,166	-	-	76,552	86,494
West Indian Rum	36,747	264,884	1,531	16,842	150,050	79,618	-	-	188,328	361,345
Total of Priced Items	325,821	454,910	13,275	26,154	690,596	351,619	-	1,015	1,029,692	833,698
Total Food	296,011	453,071	11,823	26,154	619,460	351,328	-	1,015	927,295	831,568
Total all items	332,311	517,437	13,939	26,154	692,759	411,113	-	1,015	1,039,009	955,720

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	Clearing	Entering	Clearing	Entering
Average tonnage 1768-72	6,461	6,888	11,220	9,978
Food value/ton	45.82	65.78	55.21	35.21
Total value/ton	51.44	75.12	61.75	41.20



Table A-14						
Value of Coastal Exports from and Imports into the Mid Atlantic						
	Total Exports			Total Imports		
Benchmarks	Pennsylvania	New York	Region	Pennsylvania	New York	Region
1715-1724	\$53,101	\$72,318	\$126,686	\$26,781		\$106,468
1725-1734	\$75,823	\$118,391	\$196,176	\$47,465	\$116,438	\$168,972
1735-1744	\$119,416	\$122,724	\$244,585	\$73,010	\$110,842	\$189,538
1745-1754	\$444,814	\$106,779	\$557,165		\$69,938	\$131,544
1755-1764			\$794,812			\$459,408
1765-1775	\$748,640	\$271,011	\$1,029,951	\$441,345	\$376,969	\$843,623
Base Period						
1768-72	\$692,759	\$332,311	\$1,035,425	\$411,113	\$517,437	\$957,268
1790-92	\$681,700	\$711,997	\$1,407,775	\$454,890	\$1,039,881	\$1,541,001
	<b>Per capita values</b>					
1715-1724	\$1.68	\$2.05	\$1.25	\$0.85		\$1.05
1725-1734	\$1.49	\$2.46	\$1.35	\$0.93	\$2.42	\$1.16
1735-1744	\$1.44	\$1.97	\$1.14	\$0.88	\$1.78	\$0.88
1745-1754	\$3.72	\$1.37	\$1.89		\$0.90	\$0.45
1755-1764			\$1.87			\$1.08
1765-1775	\$3.18	\$1.72	\$1.90	\$1.87	\$2.40	\$1.55
Base Period						
1768-72	\$2.88	\$2.05	\$1.86	\$1.71	\$3.19	\$1.72
1790-92	\$1.52	\$1.98	\$1.34	\$1.02	\$2.89	\$1.46
	<b>Agricultural Exports</b>			<b>Agricultural Imports</b>		
1715-1724	\$47,483	\$64,418	\$113,031	\$22,887		\$92,576
1725-1734	\$67,801	\$105,458	\$175,009	\$40,562	\$101,954	\$146,924
1735-1744	\$106,781	\$109,318	\$218,282	\$62,393	\$97,054	\$164,378
1745-1754	\$397,749	\$95,115	\$497,843		\$61,238	\$114,082
1755-1764			\$710,011			\$398,074
1765-1775	\$669,429	\$241,407	\$920,036	\$377,164	\$330,076	\$729,114
Base Period						
1768-72	\$619,460	\$296,011	\$924,719	\$351,328	\$453,071	\$829,277
1790-92	\$609,571	\$634,222	\$1,256,357	\$388,739	\$910,526	\$1,339,448
	<b>Per capita values</b>					
1715-1724	\$1.50	\$1.83	\$1.12	\$0.72		\$0.92
1725-1734	\$1.33	\$2.19	\$1.20	\$0.80	\$2.12	\$1.01
1735-1744	\$1.29	\$1.75	\$1.02	\$0.75	\$1.55	\$0.77
1745-1754	\$3.33	\$1.22	\$1.69		\$0.78	\$0.39
1755-1764			\$1.67			\$0.94
1765-1775	\$2.84	\$1.53	\$1.69	\$1.60	\$2.10	\$1.34
Base Period						
1768-72	\$2.57	\$1.82	\$1.66	\$1.46	\$2.79	\$1.49
1790-92	\$1.36	\$1.76	\$1.19	\$0.87	\$2.53	\$1.27

Notes to Table A-14:

The general method of estimation is described in the text.

The per capita values for the region in 1715-24 were estimated by extrapolating the regional value back on the change in the per capita value for Pennsylvania. The per capita values for the region 1745-54 were estimated by extrapolating the regional value forward on the change in the per capita value for New York. The regional per capita values for 1755-64 are the average of the values for the two surrounding benchmark dates.

The total values for the region for years in which the per capita value was estimated are the product of that estimated value and the regional population.

Year(s)

Table A-15  
**Food Imports into New York by Origin**

	Great Britain	Europe	West Indies (Bahamas Bermudas Caribbean)	Annual Values for New York	Estimate based on
	US \$s, prices of 1840				
1726	16,000	5,658	107,470	129,128	tonnage
1727	9,542	3,864	132,291	145,696	tonnage
1728	9,887	4,145	130,302	144,333	interpolated
1729	10,244	4,446	128,343	143,033	interpolated
1730	10,615	4,770	126,413	141,797	interpolated
1731	10,999	5,117	124,512	140,627	interpolated
1732	11,396	5,489	122,640	139,525	interpolated
1733	11,809	5,888	120,796	138,492	tonnage
1734	8,745	14,453	108,434	131,632	tonnage
1735	10,675	13,211	93,567	117,453	tonnage
1736	11,506	12,936	101,837	126,278	interpolated
1737	12,401	12,666	110,837	135,905	interpolated
1738	13,366	12,402	120,634	146,402	interpolated
1739	14,406	12,144	131,296	157,846	tonnage
1740	14,509	11,964	135,019	161,492	interpolated
1741	14,613	11,787	138,848	165,248	interpolated
1742	14,718	11,612	142,786	169,115	interpolated
1743	14,823	11,440	146,835	173,097	interpolated
1744	14,929	11,270	150,999	177,198	interpolated
1745	15,036	11,103	155,281	181,420	interpolated
1746	15,143	10,938	159,685	185,767	interpolated
1747	15,252	10,776	164,214	190,241	interpolated
1748	15,361	10,616	168,871	194,848	interpolated
1749	15,471	10,459	173,660	199,589	interpolated
1750	15,581	10,304	178,585	204,470	interpolated
1751	15,693	10,151	183,649	209,493	interpolated
1752	15,805	10,000	188,857	214,663	interpolated
1753	15,918	9,852	194,213	219,983	interpolated
1754	16,032	9,706	199,721	225,459	tonnage
1755	17,314	10,203	200,606	228,124	interpolated
1756	18,699	10,726	201,495	230,920	interpolated
1757	20,195	11,276	202,388	233,859	interpolated
1758	21,810	11,854	203,285	236,948	interpolated
1759	23,555	12,461	204,185	240,201	interpolated
1760	25,439	13,099	205,090	243,629	interpolated
1761	27,474	13,771	205,999	247,243	interpolated
1762	29,671	14,476	206,912	251,059	interpolated
1763	25,781	12,788	145,424	183,993	tonnage
1764	26,169	21,942	253,761	301,873	tonnage
1765	37,376	16,818	209,675	263,868	tonnage
1766	37,065	9,246	265,385	311,696	tonnage
1767	50,441	10,856	222,262	283,559	tonnage
1768	46,367	13,800	212,565	272,731	tonnage
1769	24,518	24,840	227,849	277,206	tonnage
1770	26,267	28,741	289,274	344,282	tonnage
1771	44,372	12,365	273,123	329,859	tonnage
1772	39,623	22,816	277,843	340,283	tonnage
1768-72 Avg.	36,229	20,512	256,131	312,872	

Table A-16  
**Food Imports into Philadelphia by Origin**

	Great Britain	Europe US \$s, prices of 1840	West Indies (Bahamas, Bermudas, Caribbean)	Annual Values for Philadelphia	Estimate based on
1720	8,291	1,380	60,687	70,358	tonnage
1721	8,356	2,116	56,192	66,664	tonnage
1722	8,097	3,588	28,224	39,909	tonnage
1723	6,218	-	42,706	48,924	tonnage
1724	6,801	1,932	63,577	72,310	tonnage
1725	10,818	1,012	56,513	68,342	tonnage
1726	16,129	1,656	80,595	98,380	tonnage
1727	9,198	1,656	74,815	85,669	tonnage
1728	16,064	4,600	61,329	81,994	tonnage
1729	18,591	3,588	66,788	88,966	tonnage
1730	10,753	2,208	113,025	125,986	tonnage
1731	11,077	7,084	105,319	123,480	tonnage
1732	14,704	3,588	101,466	119,758	tonnage
1733	12,631	9,476	115,594	137,701	tonnage
1734	14,380	9,292	140,639	164,312	tonnage
1735	16,842	13,800	92,796	123,438	tonnage
1736	25,587	14,352	89,264	129,203	tonnage
1737	17,554	15,824	107,888	141,266	tonnage
1738	15,611	10,304	112,062	137,977	tonnage
1739	17,490	20,608	87,980	126,077	tonnage
1740	30,713	28,308	83,527	142,548	interpolated
1741	23,774	17,108	87,346	128,227	interpolated
1742	16,606	6,694	91,247	114,547	interpolated
1743	25,812	16,471	98,304	140,586	interpolated
1744	26,895	16,162	104,288	147,345	interpolated
1745	28,024	15,859	110,636	154,518	interpolated
1746	29,200	15,561	117,371	162,132	interpolated
1747	30,425	15,269	124,516	170,210	interpolated
1748	31,702	14,982	132,095	178,780	interpolated
1749	33,033	14,701	140,136	187,870	interpolated
1750	34,419	14,425	148,667	197,511	interpolated
1751	35,864	14,154	157,717	207,735	interpolated
1752	37,369	13,889	167,317	218,575	interpolated
1753	38,937	13,628	177,503	230,068	interpolated
1754	40,572	13,372	188,308	242,251	interpolated
1755	42,274	13,121	199,771	255,166	interpolated
1756	44,049	12,875	211,931	268,855	interpolated
1757	45,897	12,633	224,832	283,363	interpolated
1758	47,824	12,396	238,519	298,738	interpolated
1759	49,831	12,163	253,038	315,032	interpolated
1760	51,922	11,935	268,442	332,299	interpolated
1761	54,101	11,711	284,782	350,595	interpolated
1762	56,372	11,491	302,118	369,981	interpolated
1763	58,738	11,275	320,509	390,522	interpolated
1764	61,203	11,064	340,020	412,287	interpolated
1765	63,772	10,856	360,718	435,346	tonnage
1766	55,416	39,284	350,635	445,335	tonnage
1767	79,636	26,174	383,548	489,357	tonnage
1768	44,851	46,009	378,474	469,334	tonnage
1769	35,653	89,102	376,516	501,270	tonnage
1770	30,477	125,304	485,238	641,019	tonnage
1771	52,838	58,374	441,826	553,038	tonnage
1772	50,247	74,704	425,900	550,851	tonnage

Notes to Table A-15 and A-16. The general methodology is described in the text. The entries in col. 6, “estimate based on” indicate whether the estimate was derived by directly multiplying food per ton by the reported tonnage entering, or whether it was calculated as the product of food per ton and an estimate of tonnage entering, where the latter was obtained as the product of the interpolated values of the average number of vessels entering and the average size (tonnage) of the vessels entering.

Table A-17  
**Annual Values of Food Imports into New York Philadelphia, and the Middle Colonies**  
 US \$s, prices of 1840

	Philadelphia	New York	Philadelphia Share	Middle Colonies	Population	Food Imports per Capita	
						Annual	5 year Avg.
1720	70,358		0.404	174,246	103,084	\$ 1.69	\$ <b>1.38</b>
1721	66,664		0.404	165,096	106,636	\$ 1.55	\$ 1.30
1722	39,909		0.404	98,837	110,351	\$ 0.90	\$ 1.34
1723	48,924		0.404	121,163	114,238	\$ 1.06	\$ 1.28
1724	72,310		0.404	179,080	118,305	\$ 1.51	\$ 1.33
1725	68,342		0.404	169,253	122,559	\$ 1.38	\$ 1.50
1726	98,380	129,128	0.432	227,508	127,011	\$ 1.79	\$ 1.62
1727	85,669	145,696	0.370	231,366	131,668	\$ 1.76	\$ 1.64
1728	81,994	144,333	0.362	226,327	136,542	\$ 1.66	\$ 1.73
1729	88,966	143,033	0.383	232,000	141,643	\$ 1.64	\$ 1.72
1730	125,986	141,797	0.470	267,783	146,981	\$ 1.82	\$ <b>1.69</b>
1731	123,480	140,627	0.468	264,107	152,922	\$ 1.73	\$ 1.70
1732	119,758	139,525	0.462	259,283	159,136	\$ 1.63	\$ 1.71
1733	137,701	138,492	0.499	276,194	165,637	\$ 1.67	\$ 1.62
1734	164,312	131,632	0.555	295,943	172,439	\$ 1.72	\$ 1.54
1735	123,438	117,453	0.512	240,891	179,559	\$ 1.34	\$ 1.50
1736	129,203	126,278	0.506	255,481	187,013	\$ 1.37	\$ 1.45
1737	141,266	135,905	0.510	277,171	194,820	\$ 1.42	\$ 1.37
1738	137,977	146,402	0.485	284,379	202,997	\$ 1.40	\$ 1.38
1739	126,077	157,846	0.444	283,923	211,565	\$ 1.34	\$ 1.37
1740	142,548	161,492	0.469	304,040	220,545	\$ 1.38	\$ <b>1.33</b>
1741	128,227	165,248	0.437	293,475	227,115	\$ 1.29	\$ 1.31
1742	114,547	169,115	0.404	283,662	233,893	\$ 1.21	\$ 1.30
1743	140,586	173,097	0.448	313,684	240,885	\$ 1.30	\$ 1.29
1744	147,345	177,198	0.454	324,543	248,099	\$ 1.31	\$ 1.29
1745	154,518	181,420	0.460	335,938	255,542	\$ 1.31	\$ 1.32
1746	162,132	185,767	0.466	347,898	263,220	\$ 1.32	\$ 1.32
1747	170,210	190,241	0.472	360,451	271,143	\$ 1.33	\$ 1.33
1748	178,780	194,848	0.478	373,627	279,319	\$ 1.34	\$ 1.34
1749	187,870	199,589	0.485	387,459	287,754	\$ 1.35	\$ 1.35
1750	197,511	204,470	0.491	401,981	296,459	\$ 1.36	\$ <b>1.35</b>
1751	207,735	209,493	0.498	417,228	307,417	\$ 1.36	\$ 1.36
1752	218,575	214,663	0.505	433,238	318,810	\$ 1.36	\$ 1.36
1753	230,068	219,983	0.511	450,051	330,655	\$ 1.36	\$ 1.36
1754	242,251	225,459	0.518	467,710	342,971	\$ 1.36	\$ 1.36
1755	255,166	228,124	0.528	483,290	355,778	\$ 1.36	\$ 1.36
1756	268,855	230,920	0.538	499,775	369,094	\$ 1.35	\$ 1.35
1757	283,363	233,859	0.548	517,221	382,943	\$ 1.35	\$ 1.35
1758	298,738	236,948	0.558	535,687	397,345	\$ 1.35	\$ 1.35
1759	315,032	240,201	0.567	555,234	412,324	\$ 1.35	\$ 1.35
1760	332,299	243,629	0.577	575,927	427,904	\$ 1.35	\$ <b>1.36</b>
1761	350,595	247,243	0.586	597,838	439,138	\$ 1.36	\$ 1.33
1762	369,981	251,059	0.596	621,041	450,693	\$ 1.38	\$ 1.37
1763	390,522	183,993	0.680	574,515	462,579	\$ 1.24	\$ 1.38
1764	412,287	301,873	0.577	714,159	474,805	\$ 1.50	\$ 1.41
1765	435,346	263,868	0.623	699,214	487,382	\$ 1.43	\$ 1.44
1766	445,335	311,696	0.588	757,031	500,319	\$ 1.51	\$ 1.47
1767	489,357	283,559	0.633	772,916	513,629	\$ 1.50	\$ 1.46
1768	469,334	272,731	0.632	742,066	527,322	\$ 1.41	\$ 1.53
1769	501,270	277,206	0.644	778,477	541,410	\$ 1.44	\$ 1.53
1770	641,019	344,282	0.651	985,301	555,904	\$ 1.77	\$ <b>1.54</b>
1771	553,038	329,859	0.626	882,897	570,597	\$ 1.55	\$ 1.57
1772	550,851	340,283	0.618	891,133	585,701	\$ 1.52	\$ 1.59

Notes to Table 17.

The figures for New York and Philadelphia are from Tables A-15 and A-16. Except for 1720-25, the regional figure is the sum of the values for the two ports because the evidence for 1768-72 indicates that all regional imports of food came through these two ports. The regional figures for 1720-25 were estimated by inflating the imports into Philadelphia by that port's average share of the region's total for the five year period 1726-30.

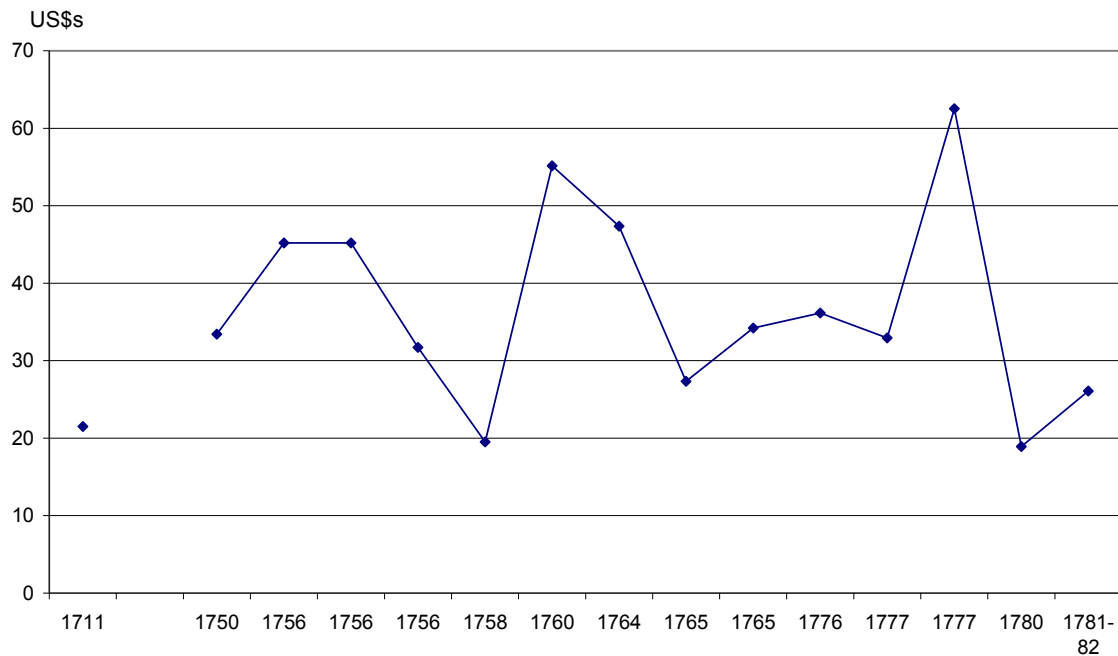
Table A-18  
Rates of Growth of Output per Worker in Agriculture  
assuming different rates of growth in the value of the diet

	Our Assumed Rate	Alternative Rates of Growth in the		
	0.1	0.0	0.2	0.37
1720-1740	0.26	0.16	0.36	0.52
1740-1770	0.14	0.05	0.23	0.38
1770-1800	0.36	0.26	0.45	0.60
1720-1770	0.19	0.09	0.28	0.44
1720-1800	0.25	0.16	0.34	0.50
1720-1730	0.30	0.21	0.39	0.54
1730-1740	0.22	0.11	0.33	0.50
1740-1750	0.70	0.59	0.81	0.99
1750-1760	-0.39	-0.47	-0.32	-0.20
1760-1770	0.12	0.03	0.21	0.36
1791-1800	1.41	1.31	1.51	1.69

In all these cases we have assumed that the rural agricultural participation rate declined at 0.07 percent per year.



Figure 1  
 Estimated Annual Amounts Spent on Provisions for Various Military Purposes  
 (1840 prices)



**Notes and Sources for Figure 1:**

"The Walker Expedition to Quebec, 1711" The Publications of the Champlain Society, Toronto 1953, pp. 251-54; Archives of the State of New Jersey, First Series, Vol. 7, Administration of Governor Belcher, p. 388; Votes of Assembly, Pennsylvania Archives, Series 8, Vol. VI, pp. 4432 and 5111, Vol. VII, p. 5503, Vol. 8, p. 7431; Thomas Gordon, *The History of Pennsylvania*, Philadelphia, 1829, p. 342; Michael McConnell, *Army & Empire*, Lincoln, University of Nebraska Press, 2004, p. 101-02; Documents from the Continental congress, June 10, 1777 (on-line at [hdl.loc.gov/loc.rbc/bdsdcc.03301](http://hdl.loc.gov/loc.rbc/bdsdcc.03301)); Proceedings of the House of Assembly of the Delaware State, 1776-1781, Claudia L. Bushman, Harold B. Hancock, and Elizabeth Moyne Homsey, eds. 19986, p. 292 and 521; *Colonial Records of Pennsylvania*, Vol. 13, Sept., 1781, Dec., 1781; Mar., 1782; April 1782, Sept. 1782, and Nov. 1782.

Most of these sources reported the quantities provided, usually of beef and pork, along with flour or bread. We valued these using the 1840 prices of the items taken from Marvin Towne and Wayne Rasmussen. 1960. "Farm Gross Product and Gross Investment in the Nineteenth Century." and Arthur H. Cole, 1938. *Wholesale Commodity Prices in the United States, 1700-1861*

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Archives of the State of New Jersey, First Series, Vol. 7, "Administration of Governor Belcher," pp. 101-401, Newark, NJ.

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